Proceedings of the Japan-Taiwan Youth Symposium on Environment Maintenance and Human Welfare 2011

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at the Grand Hotel in Taipei, Taiwan

National United University

Kisarazu National College of Technology

Preface

We Are in Pursuit of Happiness via Auspicious Technologies

Friday the 13th is called "black Friday" by western people, but Taiwanese never mind the number 13 because the two characters "吉利", which mean auspicious, have 13 strokes. National United University (NUU) chose Green and Orange Technologies (GO Tech) to be its distinguishing feature for preparing the professionals and conducting academic research. In mandarin Chinese, the pronunciation of "Green and Orange" (橘綠) is similar to "吉利" (*jili*), so NUU has devoted to auspicious technologies.

Technology is the modification of non-human or natural resources to meet human needs and wants. Orange is the color of sunshine and represents warmth. Thus, orange technology (orange-tech) symbolizes care technology, which concerns about the welfare of the aged, the minorities and all people by means of technologies, while green technology (green-tech) values sustainable development. NUU believes that the promotion of auspicious technologies enhances human happiness.

Educational Institutes with the above ideas are not single but in pairs. In recent years, Kisarazu National College of Technology (Kisarazu Kosen), NUU's good partner in Japan, has also valued the technologies related to environmental improvement and welfare improvement (環境改善和福祉向上)。Therefore, both Kisarazu Kosen and NUU decided to choose GO Tech as a common interest in their mutually beneficial exchanges and cooperation. This symposium is an action to demonstrate the common interest and a collaborative spirit.

On behalf of NUU, I highly appreciate Kisarazu Kosen's friendship and warmly welcome all distinguished guests come to take part in this symposium and sincerely wish this symposium very successful and all participants happiness!

Lung-Sheng Lee
President & Professor, National United University, Taiwan

Preface to the Proceedings for the Japan-Taiwan Youth Symposium on Environment Maintenance and Human Welfare 2011

I would like to extend my cordial greetings to you before opening the Japan-Taiwan Youth Symposium on Environment Maintenance and Human Welfare 2011.

A Japanese technical college, which consists of a 5-year semi-advanced course and a 2-year advanced course, aims to nurture highly practical and creative engineers. Some Japanese technical colleges and Taiwanese universities have ever carried out educational and academic exchange for several years, and today we hold this symposium and the students from 4 Japanese technical colleges and 4 Taiwanese universities get together here to present their research results. I am very glad to hold this symposium on expenses of Institute of National Colleges of Technology, Japan.

The theme of this symposium, "Environment Maintenance and Human Welfare", covers wide range of areas from our daily lives to global issues, and I think these the critical issues for human beings in addition to global peace. Nowadays several researches and investigations on environment maintenance and human welfare are conducted in the fields of science, technology and engineering, where the students participated in this symposium are studying. I believe this two-day symposium will play one role of these activities, and I am looking forward to further progress in the researches in these fields.

Through this symposium, we use English as an official language. Because there is an ethnic and cultural diversity in Asian countries including Japan and Taiwan, we need a common means of communication, that is, English language. I would like people of further generation to communicate in English naturally in order to live in a global society.

In Japan in March this year, the Great East Japan Earthquake and accidents at a nuclear power plant took place and many precious lives were lost. Still, this devastating catastrophe causes many difficulties to Japanese national life. After this disaster, Japan has been given warm support from people in Taiwan and all over the world and we keenly feel the importance of the international friendship under the severe conditions. Now, people all over Japan continue to effort to recover from the disaster.

Sendai City, which is one of the cities devastated in this March, is a place where Lu Xun, known as a Father of Chinese Literature, studied medicine in his twenties. Lu Xun was not good at Japanese language but one teacher of anatomy eagerly taught and encouraged him. Lu Xun respected the teacher and later wrote a novel *Mr. Fujino (Fujino Sensei)*.

Since ancient times it has been said that Japan is separated from China and Taiwan by a narrow straits and people's minds have been bonded strongly. I hope this symposium will remind us these bonds and it will be a great chance to provide a wide variety of human resources for the future.

KUDO Toshio
President, Kisarazu National College of Technology

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Part I

Environment

Research for quality living environment in Taiwan

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Due to the change of economic structure of Taiwan, the living quality is getting important than manufacturing industries. The research focus is also shifting from industrial pollution control to improvement of daily life environment. The development of high quality living technologies is base on the requirement of safety, convenience, comfortable, health and sustainability. In this talk, some of the developing technologies are chose, such as geopolymer building materials, photo catalyst, non-formaldehyde glue, video fire detection system, tap water de-chlorination shower, et, al.

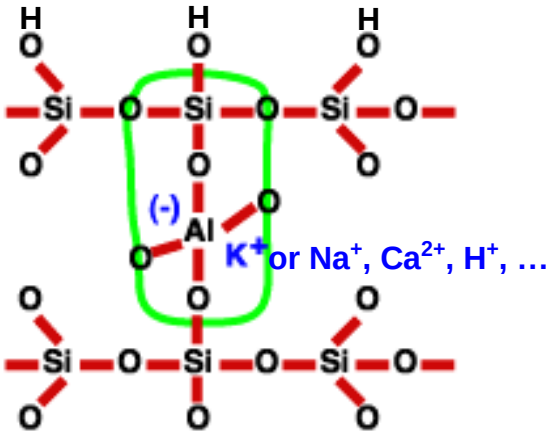

Figure 1: Geopolymer building materials

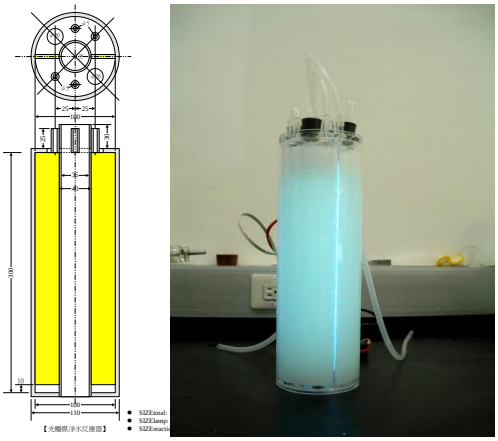

Figure 2: Photo catalyst reactor

Figure 3: Video fire detection system

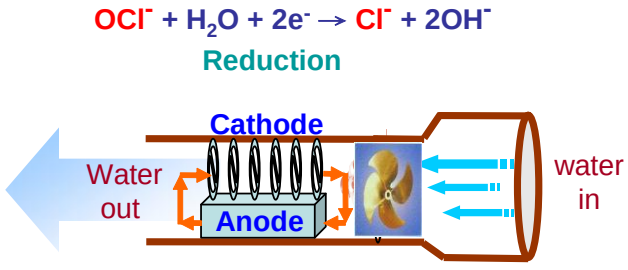

Figure 4: tap water de-chlorination shower

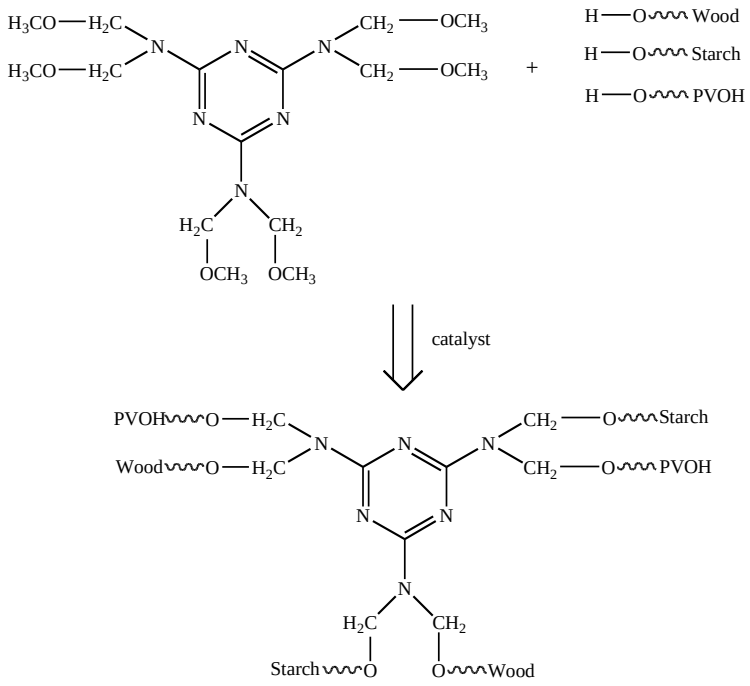

Figure 5: non-formaldehyde glue

Synthetic Lightweight Aggregates Made from Reservoir Sediments

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This paper proposes a procedure to produce lightweight aggregate (LWA) made from reservoir sediments. Physical and mechanical properties of the synthesized aggregates were assessed. The test results show that the produced aggregates possessed a hard ceramic shell, and a porous core, and a relative density ranging from 1.01 g/cm^3 to 1.38 g/cm^3, which is significantly lower than normal density of aggregates. The produced aggregates also meet the requirements of ASTM C330 with bulk density less than 880 kg/m^3 for light coarse aggregate.

Shihmen Reservoir is the third largest reservoir in Taiwan. Currently, it has silted up seriously. The accumulating deposits affect the multiple functions of the reservoir and disposal severely impacts the surrounding ecological environment. This article explains how the fine reservoir silt is being sintered into LWA suitable for concrete applications. The overall process involves dredging of the reservoir sediment, followed by its hauling, air-drying, crushing, sieving, graining, and sintering. Table 1 presents the results of physical tests of the sediments. Chemical analysis of the sediment samples is presented in Table 2. The main ingredient is SiO_2 (59.31%), followed by Al_2O_3 (19.97%), and Fe_2O_3 (6.53%). The presence of CaO and MgO makes sure to liberate CO_2 at a temperature which a glassy phase forms. The presence of fluxes (Fe_2O_3, FeO, CaO, MgO, K_2O, and Na_2O) would ensure the development of high temperature glassy phases of sufficient viscosity. The analysis results were within the limits of the expandable region on the Riley's triaxial diagram (see Figure 1) that assured the fine sediments from the Shihmen Reservoir feasible for generating lightweight aggregates. The flow chart of the manufacturing process for the synthetic LWA from reservoir sediments is described in Figure 2.

Table 1: Physical test results of the fine sediments

D_{50}	Ingredients (%)				Specific	LL	PL	PI
(mm)	Gravels	Sands	Silts	Clays	gravity	(%)	(%)	(%)
0.003	0	1.4	38.5	60.1	2.74	40.4	25.6	14.8

Note: D_{50}=more than 50% of the sample having a size greater than 0.003 mm.

Table 2: Chemical composition of the fine sediments

Chemical compositions (wt.%)										
SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	SO_3	LOI	OS	Total
59.31	19.97	6.53	1.41	2.02	0.08	0.01	0.07	7.70	2.90	99.97

Note: LOI=Loss on ignition; OS=Organic substance content.

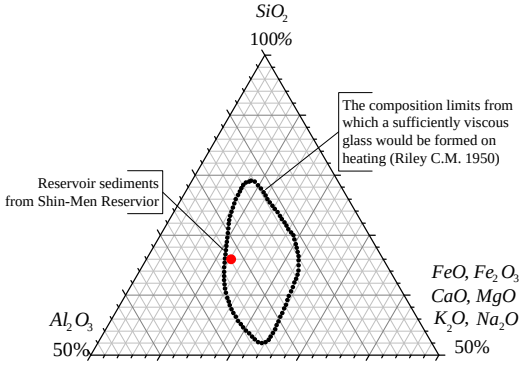

Figure 1: Composition limits of bloating clays

Figure 2: The flow diagram of the manufacturing processes for the sintered sediment LWA

All aggregates (see Figure 3) were tested for relative density and water absorption in accordance with BS 812, ASTM C330, and ASTM C29. The dry loose bulk density, relative density, and water absorption at different times for the produced aggregates (i.e. SA-600, SA-700, and SA-800 made from the reservoir sediments) are compared with CA-800 as Table 3. The aggregates were named after their bulk densities (kg/m^3). The relative densities of the produced aggregates ranging from 1.01 g/cm^3 to 1.38 g/cm^3 are significantly lower than normal density aggregates, and meet the requirements of ASTM C 330 with bulk density less than 880 kg/m^3 for coarse aggregate. Therefore, the produced aggregates can be used as LWA for structural concrete. Table 3 also summarizes the crushing strength of SA-600, SA-700, and SA-800 aggregates as 7.2 MPa, 10.0 MPa, and 13.4 MPa, respectively. In addition, SA-800 aggregate was found to have better strength than CA-800 aggregate that verifies fine sediment lightweight aggregate able to serve as structural aggregate.

Figure 3: Appearance of sintered sedimentary LWA

Table 3: Physical and mechanical properties of LWA

Type of LWA	Dry loose bulk density (kg/m^3)	Particle density (kg/m^3)	Water absorption (%)		Crushing strength (MPa)
			30-minute	24-hour	
SA-600	622	1010	5.5	12.3	7.2
SA-700	713	1160	6.3	11.1	10.0
SA-800	859	1380	6.6	10.4	13.4
CA-800	844	1410	7.1	11.5	7.5

Note: SA-600 was the sedimentary LWA; CA-800 was a commercially available LWA made in China.

References

[1] Chao-Wei Tang, How-Ji Chen, Shun-Yuan Wang, and Jack Spaulding, 2011, Production of synthetic lightweight aggregate using reservoir sediments for concrete and masonry, Cement and Concrete Composites, Vol. 33, No. 2, pp. 292-300.

[2] How-Ji Chen, Ming-Der Yang, Chao-Wei Tang, and Shun-Yuan Wang, 2012, Producing synthetic lightweight aggregates from reservoir sediments, Construction & Building Materials, Vol. 28, pp. 387-394.

EFFECTS OF ANTIMONY DOPING IN CdTe SOLAR CELLS

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CdTe is one of the most promising photovoltaic materials for use in low-cost, high-efficiency thin-film solar cells, because it has a direct band gap of approximately 1.5 eV, and because large-area, high-quality polycrystalline films of CdTe can be prepared by simple and easy methods such as close-spaced sublimation (CSS). For improving the solar cell performance of CdTe solar cells, it is important to increase the acceptor concentration in p-CdTe layer. Antimony (Sb) is a candidate dopant for p-type conductivity in CdTe because it has relatively low ionization energy and a low diffusion constant in CdTe[1)]. Furthermore, it was reported that the crystallinity improved by Sb addition in $Cu(In,Ga)Se_2$ [2)]. In this work, we attempted Sb doping by using Sb-doped CdTe powders as source materials for CSS deposition of CdTe layer in the polycrystalline CdTe thin-film solar cells.

CdTe thin film solar cells with a glass/ITO/CVD-CdS/CSS-CdTe/Cu-doped carbon/Ag structure, were fabricated. The substrate was glass (Corning #1737) with a 250-nm-thick indium tin oxide (ITO) film and a 60-nm-thick CdS layer[3)]. The CdTe films were deposited by CSS method[3)]. The thickness of the CdTe layers was between 4 and 9 mm. In the CSS deposition of CdTe layer, we used Sb-doped CdTe powders with Sb concentrations of 0 to 1×10^{20} cm^{-3} as source materials. The Sb-doped CdTe powders were obtained by the powderization of Sb-doped CdTe bulk polycrystals. Cu-doped carbon electrode was prepared by screen printing followed by heat treatment for Cu diffusion into CdTe layer at 325°C for 15 min[3)].

Figure 1 shows the cell parameters of CdTe thin-film solar cells as a function of the Sb concentration in the CdTe source materials. Conversion efficiency increased with increasing the Sb concentration below 1×10^{18} cm^{-3}, due to mainly improving the fill factor. This result indicates that the solar cell performance improves with Sb doping. Above $1´10^{19}$ cm^{-3}, however, the conversion efficiency drastically decreased. We achieved 14.9% efficiency (V_{OC} : 0.822 V, J_{SC} : 26.1 mA/cm^2, F.F.: 0.693, 0.24 cm_2, AM 1.5) by using the Sb-doped CdTe source with Sb concentration of 1×10^{18} cm^{-3}.

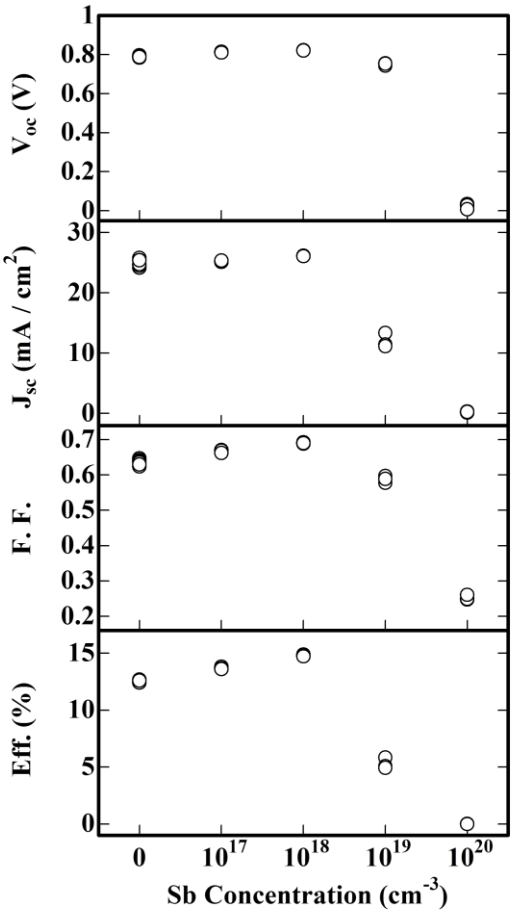

Fig. 1 Cell parameters of CdTe thin-film solar cells as a function of the Sb concentration in the CdTe source materials.

In order to clarify the effects of Sb doping on the properties of the CdTe layer, we measured the low-temperature photoluminescence (PL) spectra of the as-deposited CdTe layers.

The intensity of the donor-acceptor pair (DAP) emission at approximately 800 nm increased with increasing the Sb concentration. This result suggests that Sb atoms were incorporated into the CdTe layers as effective acceptors by using the Sb-doped CdTe source.

Figure 2 shows the SIMS depth profiles of Sb in the CdTe solar cells by using the CdTe sources with and without Sb. In the CdTe solar cell by using the CdTe source without Sb, Sb was not detected in the CdTe layer. On the other hand, the Sb impurities with concentration of approximately $1´10^{16}$ cm^{-3} were incorporated into the CdTe layer by using the Sb-doped CdTe source of 1×10^{18} cm^{-3}.

Figure 3 shows depth profiles of the acceptor concentration in the CdTe solar cells by using the CdTe sources with and without Sb. The depth profiles of the acceptor concentration were measured by *C-V* characteristics. It was found that there was no distinct difference between the acceptor concentrations in CdTe layers with and without Sb doping. This result indicates that Sb addition has little influence on acceptor concentration. Therefore, the improved performance by the Sb addition in CdTe solar cells was probably due to the improvement of crystallinity such as the increased grain size.

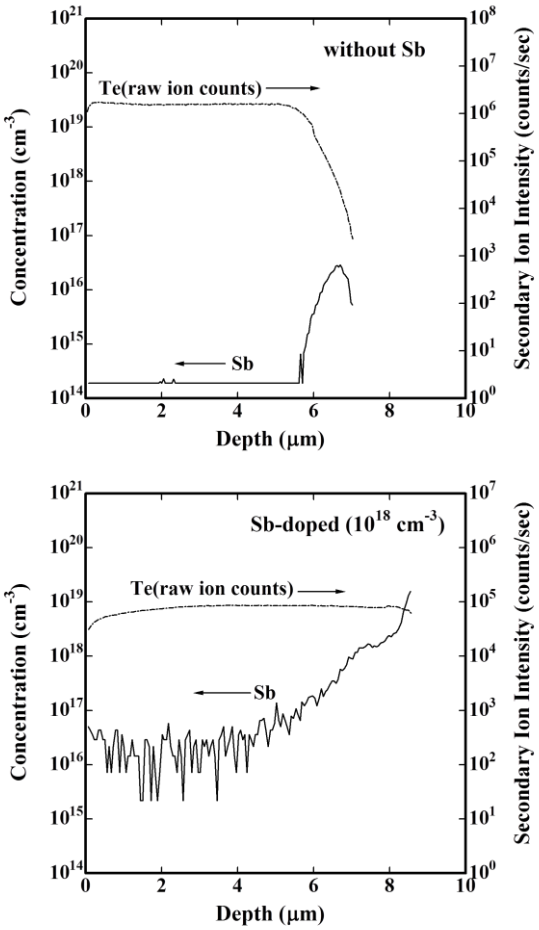

Fig. 2 SIMS depth profiles of Sb in the CdTe layers.

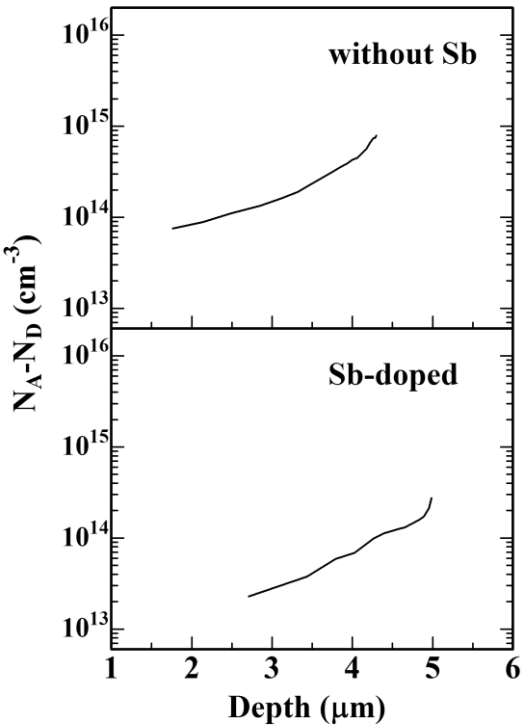

Fig. 3 depth profiles of the acceptor concentration in the CdTe layers.

References

1) H. Zhao, Alvi Farah, D. Morel, and C. S. Ferekides, "The Effect of Impurities on the Doping and V_{OC} of CdTe/CdS Thin Film Solar Cells", Thin Solid Films **517**, 2365 (2009).
2) Min Yuan, Min Yuan, David B. Mitzi, Wei Liu, Andrew J. Kellock, S. Jay Chey, and Vaughn R. Deline, "Optimization of CIGS-Based PV Device through Antimony Doping", Chem. Mater. **22**, 285 (2010).
3) Tamotsu Okamoto, Yoshinori Harada, Akira Yamada, and Makoto Konagai, "Improved Performance of CdTe Thin Film Solar Cells through Controlling the Initial Stage of the CdTe Layer Deposition by Close-Spaced Sublimation", Sol. Energy Mater. Sol. Cells **67**, 187 (2001).

The lipid-lowering effect of different fractions of supercritical fluid extract of Pinus morrisonicola Hay *in vitro*

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Abstract

Pinus morrisonicola Hay (PM), also known as "five leaves pins" (FLP) in Chinese, distributes at 300-2300 m altitude in Taiwan. Traditionally, it was used as beverages for lowing blood pressure. PM has been shown to reduce plasma cholesterol and LDL levels and to prevent hypertension. PM was extracted by the technique of supercritical fluid extraction-CO2 (SFC) under 40℃,25 MPa, 15 min and 3 ml water (adjuvant solvents) to obtained PME 3 with extraction yields of 3.9%. The aim of this study is to evaluate the lipid-lowering effect of different fractions of PME3. The methods of separation and purification were by the silica-gel column and thin layer chromatography (TLC) to obtain four fractionates (PME3-1, -2, -3, -4). The DPPH scavenger effect of PME3-1 was significantly increase 2 folds by PME3, the IC50 of scavenger effects were 2 and 4 mg/ml. However, the other fractionates did not reveal the DPPH scavenger effects. The results also show that under the concentration of 25-500 □g/ml of PME3-1 was the potent fractionate on the inhibition of Cu+2-induced conjugated diene formation on LDL and lipid-lowing activity (oxLDL-induced foam cells formation in macrophage) in vitro. Future, the lipid-lowing effects of PME3-1 in vivo was undertaken.

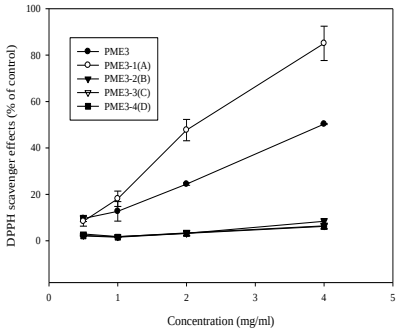

Figure 1: Pinus morrisonicola Hayata extract and its fractionates on scavenging DPPH free radical capability. PME3: Crude extract; PME3-1(A): fractionate1 ; PME3-2(B) : fractionate2 ; PME3-3(C) : fractionate 3 ; PME3-4(D): fractionate 4.

In Fig.1.The activity of the PME3 and its four fractionates (PME3-1, -2, -3, -4) on scavenging DPPH radicals is 40 %, 84 %, PME3-2(B): 6%, PME3-3(C): 7%, PME3-4(D): 4%, respectively. We found the PME3-1(A) is better on scavenging DPPH free radical capability which contained (84%) and IC50 : 2 mg/ml, but the other fractionates did not reveal the scavenger effects.

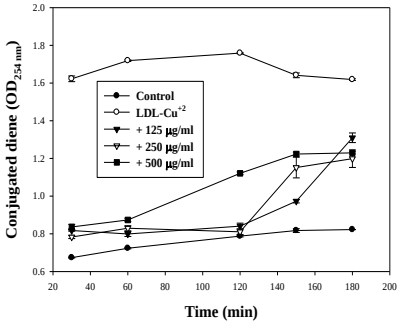

Figure 2: Effect of PME 3-1 (125~500 μg/ml) on Cu+2-induced conjugated diene formation on LDL under different incubation time (30~180min).

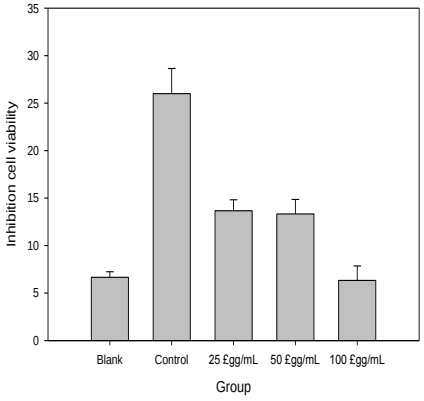

Figure 3: Inhibition effect of PME3-1 (25~100 μg/ml) on the ox-LDL-induced foam cells formation in macrophage. Control : adding ox-LDL-induced but not added to the sample in 12well. Blank : no added sample and ox-LDL in 12well.

Fig.2. The results showed that the formation of conjugated diene is increased when LDL with Cu+2 reaction time increases, and conjugated diene formation is reached highest point, when the reaction time in 120min. Conjugated diene formation began to decline after the 120min. Therefore, we design the reaction time (120min) as assessed PME3-1 (A) inhibition of Cu +2-induced LDL oxidation to form conjugated diene. In Figure 2, the PME3-1 (A) is to show a dose-effect of inhibiting the formation of conjugated diene, which could inhibit the conjugated diene formation in 500μg/ml and inhibition effect is about 85% and IC50: 250 μg/ml. Therefore, PME3-1 (A) maybe has a cholesterol-lowering potential.

In Fig.3. Found the PME3-1 (25~100 μg/ml) that is to show different compared with the control group. Related reports showed that the LDL oxidation was mainly caused to atherosclerosis formation. LDL oxidation process of the formation of conjugated diene that is lead to the decomposition of vitamin E. Therefore, the amount of conjugated diene formation is use to as an indicator of lipid oxidation.

References

Folch, J., Lees, M., and Stanley, G. H. S. 1957. A simple method for the isolation and purification of total lipids from animal tissue. J. Biol. Chem.226:497-509

Frostegard, J., Haegerstrand, A., Gidlund, M., and Nilsson, J. 1991.Biologically modified LDL increases the adhesive properties of endothelial cells. Arthrosclerosis. 90:119-126.

Fukuda, Y., Nagata, M., Osawa, T., and Namiki, M. 1986. Chemical aspects of the antioxidative activity of roasted sesame seed oil and the effect of using the oil for frying. Agric. Biol. Chem. 54:857-86

Development of the Underwater Robot
-The Actuator Concentration Type Removable Underwater Manipulator-

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The authors have been developing an underwater robot for the conservation of marine life in the Okinawa sea[1], [2], [3]. The decrease in coral cover is caused by the impact of bleaching due to high water temperature, red soil runoff, water pollution, and the coral- eating starfish outbreaks. It is necessary to undertake proper measurement, observation and sampling in the water. In order to succeed in performing these tasks, we needed to develop an underwater robot that can respond flexibly to the problem. Underwater tasks can be summarized in the following two.

- Acquisition of image and environmental information using camera and several sensors.
- Collecting objects and performing other necessary works using robot hand.

The initial task does not need a manipulator, whereas the second one needs it. The manipulator has to be quickly attached to the underwater robot when needed. Therefor, the authors have been deveroping a quick-release manipulator.

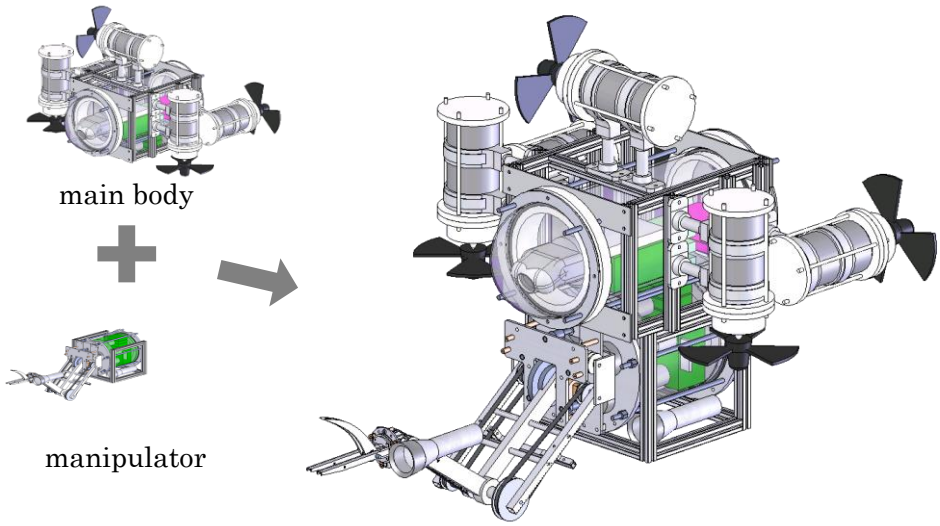

Figure 1: The 3D CAD model of the main body and the manipulator

Fig.2 shows the appearance of experiment in the pool. Fig.2 (a) shows the picture taken from the water using the store-bought underwater camera. A video camera is mounted on the tip of the manipulator. Looking at the view

from the camera (Fig.2 (c)), you can see the operation performed using the operation PC (Fig.2 (b) left). It is possible to obtain a more complete view of the surrounding with the network camera "AXIS213PTZ", mounted on the container body of under robot (Fig.2 (d)). The view can be seen on the surveillance PC (Fig.2 (b) middle). Moreover, it only takes about 10 seconds to detach the underwater robots and the manipulators by removing four screws and a power cable.

(a)The image of the underwater robot

(b)The operation PC and the surveillance PC

(c)The image of the operation PC

(d)The image of the surveillance PC

Figure 2: Appearance of experiment in the pool

References

[1] R. T. Shiroku, F. Takemura and S. Sagara, "Development of the Actuator Concentration Type Removable Underwater Manipulator", The 28th Annual Conference of the Robotics Society of Japan (RSJ 2010), 1G3-7, 2010

[2] F. Takemura and R. T. Shiroku, "Development of the Actuator Concentration Type Removable Underwater Manipulator", The 11th International Conference on Control, Automation, Robotics and Vision(ICARCV2010), pp.2124-2128, Singapore, December, 2010.

[3] R. T. Shiroku, F. Takemura, K. Kawabata and S. Sagara "Development of the Actuator Concentration Type Removable Underwater Manipulator –Control of the Manipulator-", JSME Robotics and Mechanics Conference 2011 (ROBOMEC 2011), 1A2-M08, 2011

Study of light-driving reactions in oxidizing organic pollutants in liquid

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To combine the beneficial uses of solar energy with the patent awarded catalyst, EDTA-Fe, in degrading the targeted toxic organics, crystal violet (CV) and 3-, 3,4- and 3,5-chlorophenols (3-, 3,4- and 3,5-CPs), this study aimed to (1) study the degradation efficiency of the targeted compounds via auto-decomposition of peroxide, (2) investigate the degradation efficiency of the targeted compounds via TiO2-assisted photocatalysis, and (3) to determine the optimal conditions of using solar energy in treating toxic organic compounds.

The optimal operating conditions of using electro-potential were set by using fluorine-doped tin oxide (FTO) glass as anode and TiO2-coated FTO (TiO2-FTO) as cathode at fixed current of 6 mA. After one hour of treatment, the CV deduction was ~92%.

When replacing the electropotential with sunlight for one hour using same electrodes, the results showed the CV degradation decreased about 75%; if using UV instead, the degradation was about 63% of that of runs receiving sunlight. Also the TiO2-FTO electrode showed the adsorption of CV (~40% of total CV added) and some detachment of TiO2 layer due to the reaction. The TiO2 detachment was fixed by soaking the TiO2-FTO electrode in 0.003 M EDTA-Fe solution for 12 hours. Connection of two electrodes by copper wire might further elliveate the detachment of TiO2 as well.

The optimal dosages of buffer and EDTA were determined at adding 1.37M buffer 0.375mL and 0.216M EDTA 0.75 mL in 23.75 mL of the targeted compound polluted solution. Under such optimal conditions, the degradation of CV over time was satisfactorily predicted by a first-order kinetic model with kinetic constant of 1.1171/hr if using sunlight and 0.385/hr if using UV light.When treating CPs at the optimal conditions, the run without sunlight showed 30-50% sorption of CPs, yet after a two-hours treatment around 15% of CPs degradation was observed.

Keywords: EDTA-Fe complex, crystal violet (CV), chlorophenols (CPs), photo-catalysis, titanium dioxide (TiO2)

References

An, Taicheng, Hai Yang, Guiying Li, Weihua Song, William J. Cooper, and Xiangping Nie. 2010. Kinetics and mechanism of advanced oxidation processes (AOPs) in degradation of ciprofloxacin in water. Applied Catalysis B: Environmental. 94: 288-294.

Box,G.E.P. a. B., D.W. 1960. Some new three level designs for the study of quantitative variable. Technometrics(2): 455-475.

Bahamonde, Ana, Cristina Ada´n, Arturo Martı´nez-Arias, and Sixto Malato. 2009. New insights on solar photocatalytic degradation of phenol over Fe-TiO2catalysts: Photo-complex mechanism of iron lixiviates. Applied Catalysis B: Environmental. 93: 96-105.

Bahnemann, Detlef, Donia Friedmann, and Cecilia Mendive. 2010. TiO2 for watertreatment:Parametersaffectingthekineticsandmechanisms of photocatalysis. Applied Catalysis B: Environmental.

Beltra´n, Fernando J., Eva Rodrı´guez, Guadalupe Ferna´ ndez, Beatriz Ledesma, and Pedro A´ lvarez. 2009. Photocatalytic degradation of organics in water in the presence of iron oxides:Influence of carboxylic acids. Applied Catalysis B: Environmental. 92: 240-249.

Benitez, F. Javier, Juan L. Acero, Francisco J. Real, and Juan Garc ıa. 2003. Kinetics of photodegradation and ozonation of pentachlorophenol. Chemosphere. 51: 651-662.

Bielefeldt, Angela R., Todd L. Cort, and Myoung-Suk Song. 2002. Nonionic surfactant effects on pentachlorophenol biodegradation. Water Research. 36: 1253-1261.

Borden, R.C., R.T. Goin, and C.M. Kao. 1997. Control of BTEX migration using a biologically enhanced permeable barrier. Ground Water Monitoring and Remediation. 187(1).

Bigda, R. J. 1995. Consider Fenton's Chemistry for Wastewater Treatment. Chemical Engineering Progress, 91, 62-66.

Chen, Shyi-Tien, D. K. Stevens, and Guoyoung Kang. 1999. Pentachlorophenol and Crystal Violet Degradation in Water and Soil Using Heme and Hydrogen Peroxide (SCI). Water Research. 33(17): 3657-3665.

Chen, Shyi-Tien, Joseph Dong, P. M. Berthouex, and W. C. Boyle. 2000. Fate of Pentachlorophenol (PCP) in an Anaerobic Sludge Digester (SCI). Water Environment Research. 72(2): 201-206.

Chen, Shyi-Tien*, and P. M. Berthouex. 2001. Treating an Aged Pentachlorophenol- (PCP-) Contaminated Soil through Three Handling Processes- Anaerobic Sludge Digestion, Post-Sludge Digestion and Sludge Land Application (SCI). Water Science and Technology. 44(10): 149-156.

Chen, Shyi-Tien*, and P. M. Berthouex. 2003. Use of an Anaerobic Sludge Digestion Process to Treat Pentachlorophenol- (PCP-) Contaminated Soil (SCI). Journal of Environmental Engineering (ASCE). 129(12): 1112-1119.

Chen, Shyi-Tien*, C.-Y. Hsu, and P. M. Berthouex. 2006b. Fate and Modeling of Pentachlorophenol (PCP) Degradation in a Laboratory-Scale Anaerobic Sludge Digester (SCI). Journal of Environmental Engineering (ASCE). 132(7): 795-802. (Up to 2 pages)

The activity of KNCT on Down-flow Hanging Sponge reactor

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Introduction

The down-flow hanging sponge (DHS) reactor was originally developed for sewage treatment, which employs polyurethane sponge media to retain microbial biomass. Wastewater is trickled from the top of the reactor, and is purified by the microorganisms within and on the surface of the sponge medium as it flows down through the reactor. Because the sponge medium of the DHS reactor is exposed to the atmosphere, oxygen is naturally dissolved into the wastewater, obviating the need for external aeration. Additionally, the sponge can retain a large amount of sludge, greatly extending sludge retention time. Therefore, cost-effective and high-rate wastewater treatment is possible on DHS reactor.

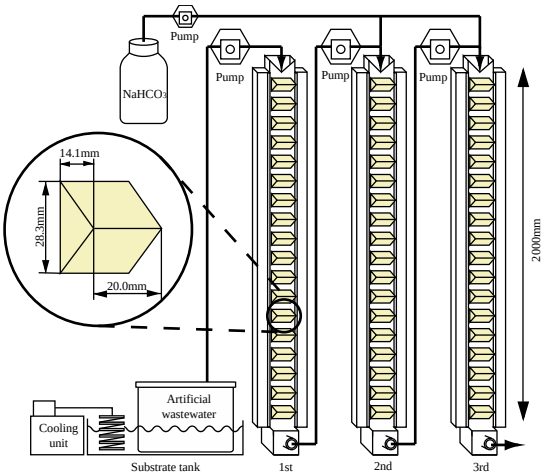

Fig.1 The DHS reactor used in this study

Coke-plant wastewater is produced from the process of washing gas from the coke ovens used to produce coke for steel production. This wastewater contains large amounts of ammonium nitrogen, phenol, thiosulfate, and cyanides, as well as high salinity derived from the seawater. In Japan, coke-plant wastewater is usually treated using conventional activated sludge systems. However, the activated sludge systems on treatment of this wastewater require long hydraulic retention time (HRT) and extensive control of operational parameters.

On the other hand, we previously applied DHS reactor to artificial coke-oven wastewater in order to establish a simple, novel, and cost-effective process for the treatment of saline wastewater. DHS reactor used in our study is shown in Fig. 1. As a result, we obtained 96.8% of ammonium oxidation rate and 99.6% of organic matter removal rate. Interestingly, there were also two noteworthy phenomena. One of them was the decrease of total nitrogen concentration in the effluent vs. that in the influent, suggesting that denitrifying bacteria converted NO_3-N to nitrogen gas within the sponge media of the reactor. Therefore, the DHS reactor was suggested to have a possibility of denitrification ability. The other was that nitrite accumulation in the effluent was observed during some period. In general, ammonia is oxidized to nitrite (nitritation) by ammonia-oxidizing bacteria (AOB), and nitrite is further oxidized to nitrate (nitratation) immediately by nitrite-oxidizing bacteria (NOB). We posited that salinity inhibited NOB, leading to the nitrite accumulation *i.e.* nitritation. If a stable nitritation process can be established, a cost-effective nitrogen removal wastewater treatment system could be developed such as anaerobic ammonium

oxidation (ANAMMOX) process. Based on these results, further two researches were conducted as follows.

Promotion of denitrification in the DHS reactor

In order to reduce nitrogen load of denitrification processes after DHS process, we tried to promote the denitrification ability in the DHS reactor by recirculation of 3rd unit (final effluent) including a large amount of NO_x to the influent. Artificial wastewater containing mineral and buffer solutions, as well as 600 mg/L phenol (1400 mg-COD/L), 500 mg-N/L NH_4Cl and 3600 mg/L $NaHCO_3$ was prepared (HRT = 12 h, 20-25˚C).The recirculation ratio, *i.e.*, the ratio of influent flow rate vs. recirculation flow rate of the effluent, was adjusted in the range between 0 and 2.0 (R0, R0.5, R1.0, R1.5, and R2.0). Fig. 2 shows the fractions of effluent NH_4-N, NO_2-N, and NO_3-N vs. the influent NH_4-N at each recirculation ratio. The total amount of inorganic nitrogens in the final effluent showed a tendency to decrease with the increase of the recirculation ratio from R0 to R1.5, and then, it slightly increased at R2.0. Therefore, it can be concluded that denitrification ability of the DHS reactor was promoted by recirculation of final effluent, and the optimal recirculation ratio is R1.5.

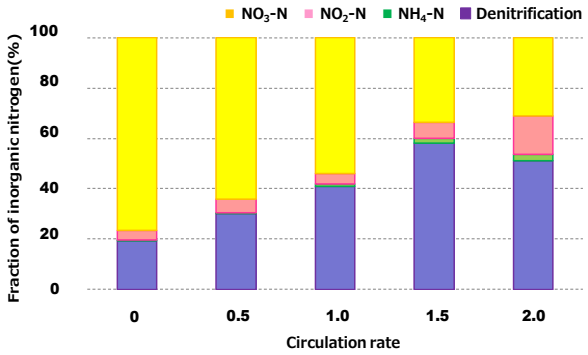

Fig.2 Fraction of the ratio of each IN of the effluence

Stimulating Nitritation in DHS process

We investigated the effect of salinity on nitritation in a DHS reactor in this study. The DHS reactor was operated by feeding an artificial wastewater containing 100 mg-N/L NH_4Cl (HRT = 2 h, 20-25˚C) for more than 1400 days. The salinity of the influent was controlled by adding NaCl in the range of 0-25 g-Cl/L through the experiment. Fig.3 shows the ratio of NH_4-N, NO_2-N, and NO_3-N at each salinity condition. The nitrite in the effluent increased with the increment of salinity. *i.e.*, the fraction of nitrite to the total nitrogen in the effluent increased from 1.6% at 0 g-Cl/L to 87.6% at 25 g-Cl/L. Fluorescence *in situ* hybridization analysis revealed that, as salinity increased, the nitrifying bacterial community in the DHS changed remarkably at the species level. In particular, the dominant nitrite-oxidizing bacteria changed from *Nitrospira*-sublineage I at 0 g-Cl/L to *Nitrobacter* spp. at 15 g-Cl/L. At 25 g-Cl/L, no nitrite-oxidizing bacteria were detected. This succession of nitrifying bacterial community and inhibition of NOB by salinity stress might promote nitritation in this study. The DHS reactor is suitable for cost-effective nitritation processes and ~~that~~ salinity control using NaCl is an effective method for the purpose of inducing nitritation.

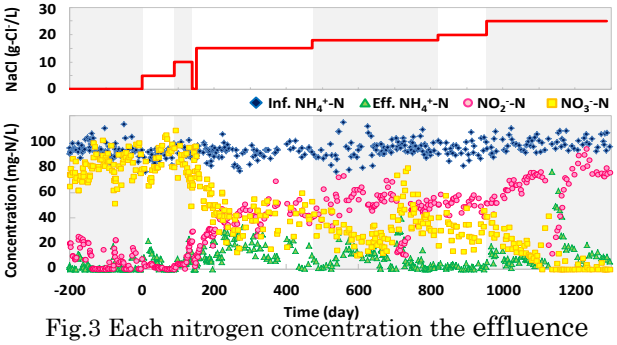

Fig.3 Each nitrogen concentration the effluence

In conclusion, our research revealed that DHS reactor has a possibility of application to both conventional nitrification-denitrification process and nitritation-ANAMMOX process in cost-effective way. Thus, our findings show the promising ability of DHS process on nitrogen removal process.

Recycle of fly ash and sludge for producing value-added ceramic tile

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The total amount of municipal solid waste incineration (MSWI) fly ash in Taiwan was 1.93 x 10^5 T/Y in 2010. Most of MSWI fly ashes failing TCLP (Toxicity characteristic leaching procedure) test, especially in heavy metal, are identified as hazardous waste and treated by cement solidification and isolated landfill. Another waste, polished porcelain tile (PPT) sludge generating from tile manufactories, was 5.0 x 10^4 T/Y and usually dumped because of containing grindstone compounds such as SiC, Cl and S. In this study, we developed a novel method for recycling detoxic MSWI fly ash and PPT sludge as lightweight tile. Firstly, MSWI fly ash and PPT sludge were pretreated by water extraction and ultrasonic cavitation. Pretreated MSWI fly ash and PPT sludge at the ratio of 10%:90% were then mixed, and an extra 10% and 20% SiO_2 were added respectively for complementing the necessity of tile constituents as shown in Fig.1. A consequent procedure for preparing green body of tile samples was as follows: ball milling, granulating, and compression moulding.

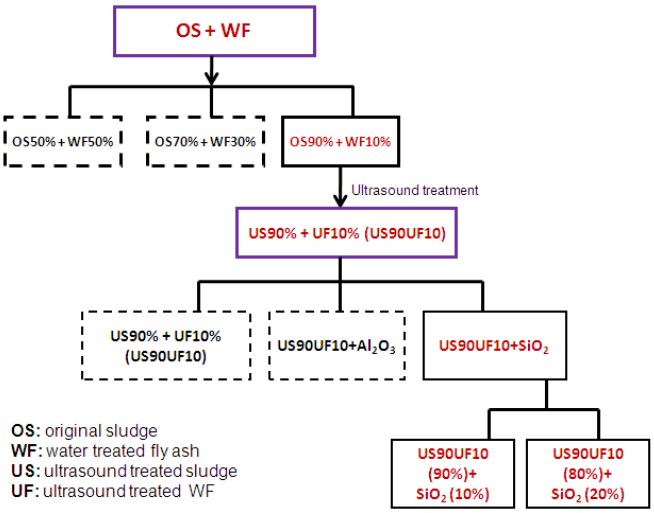

Fig. 1. Material preparation procedure

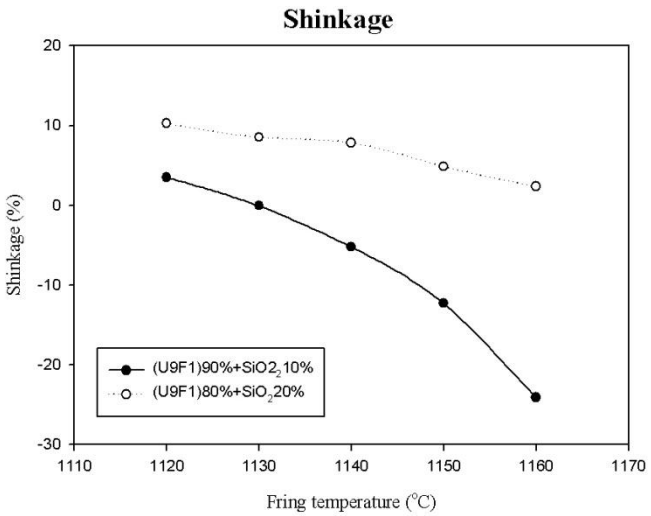

Fig. 2. Shrinkage measurement of lightweight tile

A wide firing temperature of 1,000–1,180 °C was tested and a proper temperature range of 1,120–1,180 °C was employed for all lightweight tile samples. After firing, the performances of all samples including shrinkage, water absorption, and bulk density were measured (Fig. 2–4) and evaluated. The results show that 20% extra-SiO_2 samples presented more stable in tile shape and increasing firing temperature tended to decrease the bulk density of

tile, as seen in Fig. 5. Lightweight tiles with bulk density ranging from 1.75 to 1.10 g/cm^3, lighter than ordinary tile, were produced and the possibility of recycling fly ash and sludge to fabricate value-added lightweight ceramic tiles was also verified.

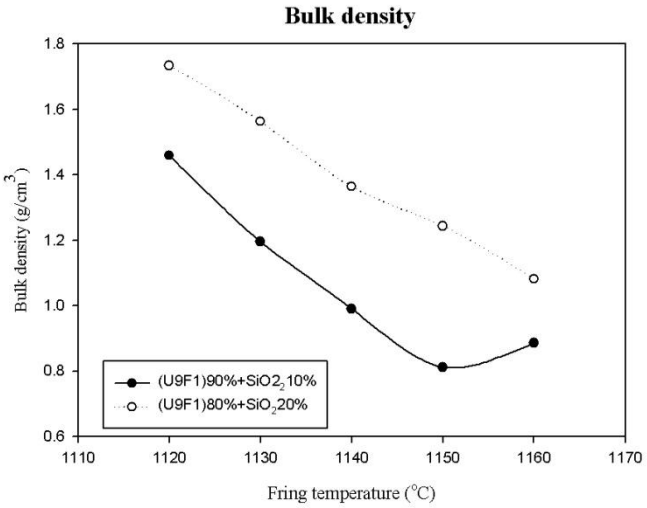

Fig. 3. Bulk density of lightweight tile

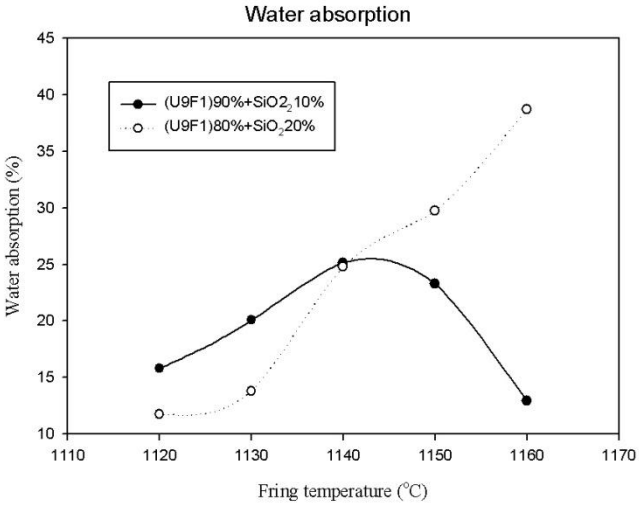

Fig. 4. Water absorption of lightweight tile

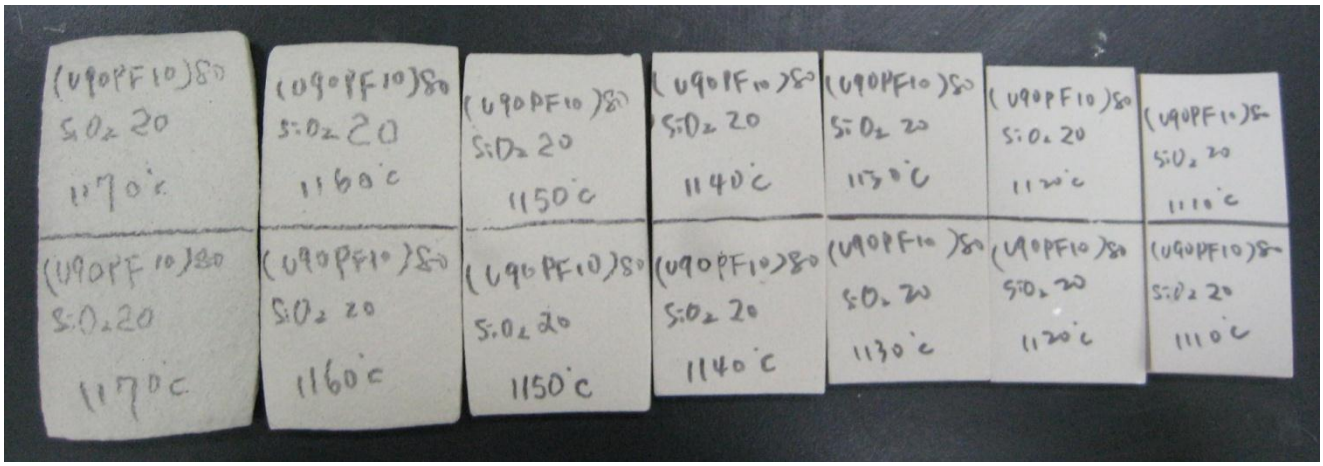

Fig. 5. The lightweight ceramic tiles made by PPT, MSWI fly ash + 20% extra-SiO_2.

References

[1] Environmental Protection Administration, 2011, The statistics of incineration of municipal solid waste, Executive Yuan, Taiwan.

[2] Bernardin A.M., Silva M.J.da, Riella H.G., 2006, Characterization of cellular ceramics made by porcelain tile residues, Materials Science and Engineering: A, 437(2): 222–225.

[3] Rambaldi E., Esposito L., Tucci A., Timellini G., 2007, Recycling of polishing porcelain stoneware residues in ceramic tiles, Journal of the European Ceramic Society, 27(12): 3509–3515.

Study of UV irradiation effects in CR-39 plastics for environmental radiometry

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Since the radiation leak in the Fukushima nuclear power plant, the environmental radiometry has been in great demand as a means to preventing its damage. There are various types of radiation detectors, and each of them has its advantages and disadvantages in measurement. **Figure 1** shows the photograph of CR-39 which has often been used as a solid-state nuclear detector recently. CR-39 is an allyl diethylene glycol carbonete (called ADC) which is a kind of optical plastics and also exhibits good properties for radiation measurements. It is compact in size and they have no power supply structure that is influenced by rain and various dusts. Therefore it is suitable for environmental dosimetry[1)]. **Figure 2** shows the micrograph of CR-39 surface irradiated with the environmental radiations from the ground. However, there are still some problems. For example, it takes time for analysis by hand. Another disadvantage is its expensiveness though the high-speed analysis microscope is developed at an extra cost. Therefore the keys to practical realization in CR-39 are fast analysis and price reduction. It has been reported that the track etch rate increased when CR-39 detectors were exposed to ultraviolet rays (called UV)[2)]. It has been expected that UV irradiation on CR-39 has application potentiality. However, up till now, relatively few studies have been reported on the effect of UV irradiation on CR-39. Therefore the application of this method has possibilities to cut down analysis time. In the present work, we investigated the effects of UV on CR-39.

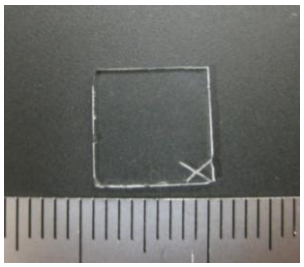


Figure 1: Photograph of CR-39 plastics.

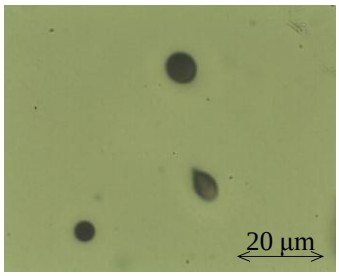


Figure 2: The typical micrograph due to the environmental radiations.

Figure 3 shows the alpha track generation theory. When heavy charged particles pass through solid insulator (e.g.,CR-39), if energy added to solid insulator exceeds a constant level, it leaves the alpha tracks in the solid insulator. Their tracks are expanded to detectable level with the optical microscope by chemical etching because

they are too small to see with the naked eye. While etching, the solid insulator surface without the tracks is removed by V_B, and the tracks are removed by V_T. There is a difference in etching progress between V_T and V_B because V_T is faster than V_B. The track expanded by this difference is called "etch pit". Detecting the size and form of etch pits, it is possible to obtain some data about the radiations.

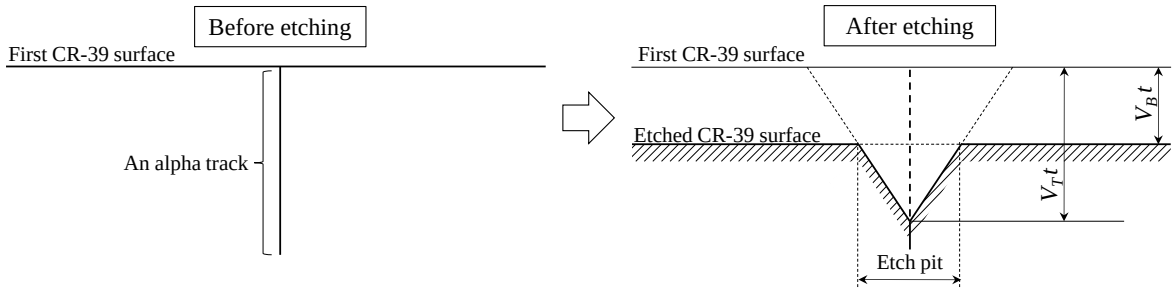
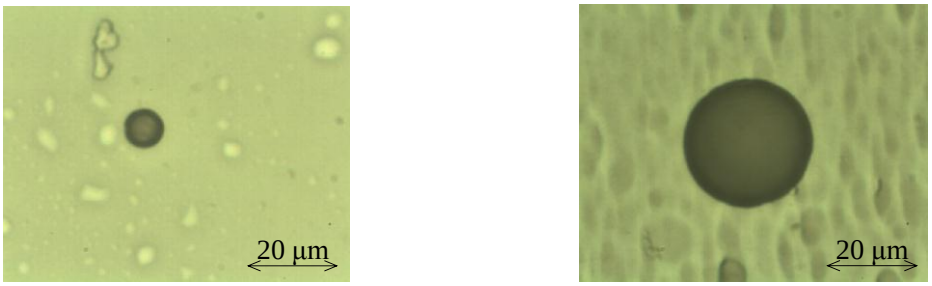


Figure 3: Etch pit generation theory.

The experimental conditions of the various samples of CR-39 were varied for comparison. Firstly, the experiment on the effect of UV wavelength on CR-39 was done. The samples of CR-39 were divided into two groups. One group was irradiated with 254 nm during UV irradiation, while the other was irradiated with 365 nm. Secondly, the experiment in the effect of UV dose rate on CR-39 was done. UV exposure time (called T_{UV}) varied from 10 to 100 h in the UV irradiation process for comparison. We also did some experiments. At the result of these experiments, the optimum T_{UV} condition was observed. The area ratio between the etch pit not exposed UV and the etch pit exposed UV for 20 h is up to 16 (refer to **Figure 4**).



(a) Image of the etch pit not exposed UV. (b) Image of the etch pit exposed UV for 20 h.

Figure 4: Change of the etch pit area by UV irradiation.

UV irradiation on CR-39 is counted on the advancement of α-ray detection efficiency and the accuracy because the etch pits are expanded more by it. Additionally it has possibilities for the application of the analysis automation.

References

1) Shang Binga, CR-39 radon detector, *Nuclear Tracks and Radiation Measurements*, **22** Issues 1-4, 451-454 (1993).

2) K.C.C.Tse et al., Effect of UVC irradiation on alpha-particle track parameters in CR-39, *Radiation Measurements*, **43**, S98-S101 (2008).

The examination of vegetation on trees species and road landscape shape

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21st Century is the important moment for the government proceeds to Green turn of city and Ecocity. In metropolitan space arrangement, to build the Green bring of tree crown layer of street tree to be a target, from individual, community, roadway, green land of park and official vegetation planting, making the country becomes a technology island of ecocity to be the same expect of the whole people in the county.

Before the vegetation, there are some factors to be consider for species planting: (1) Planting objective, landscape creating and roadway safety. (2) The right place and the right variety & Agrestic plant. (3) Vegetation looks and functions (4) Vegetation grow habits. (5) Vegetation arrangement ; thinks over species selection, knows grow areas of plants, habits and features in diversities, to make the right palce and the right variety, and to make vegetation to bring the most effect of landscape environment.

Street trees play important roles of the landscape environment in the city, it can not only improve the living quality but also improve visual landscape; therefore, species selection will lead the possibility of creating of the follow-up street landscape. The Street landscape creating of green tunnel buildling, season colors changing (shed leaves and show a flower), additional value (fruit tree species), biotic diversity and functional or public art and light gallery…etc.

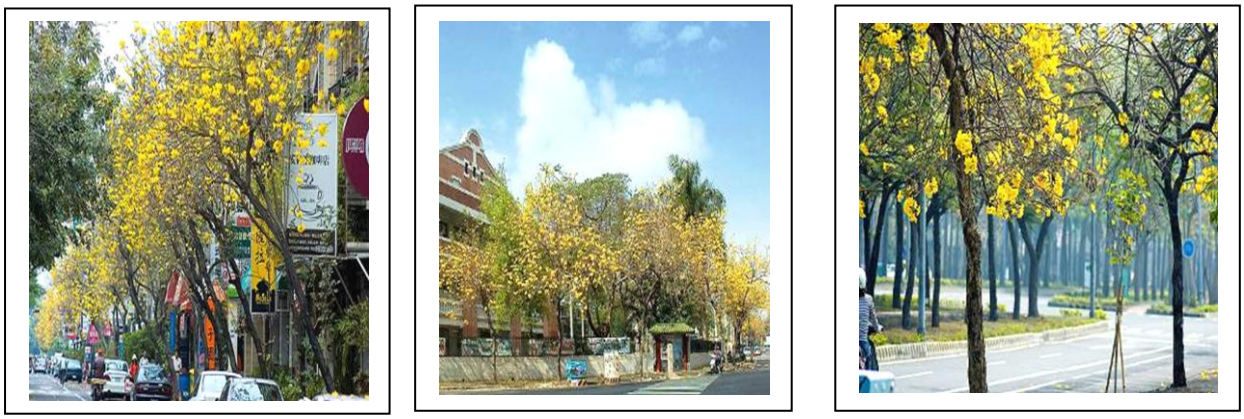

Figure 1: Street landscape--***Tabebuia chrysantha***

Figure 2: Street landscape-- ***Prunus campanulata***

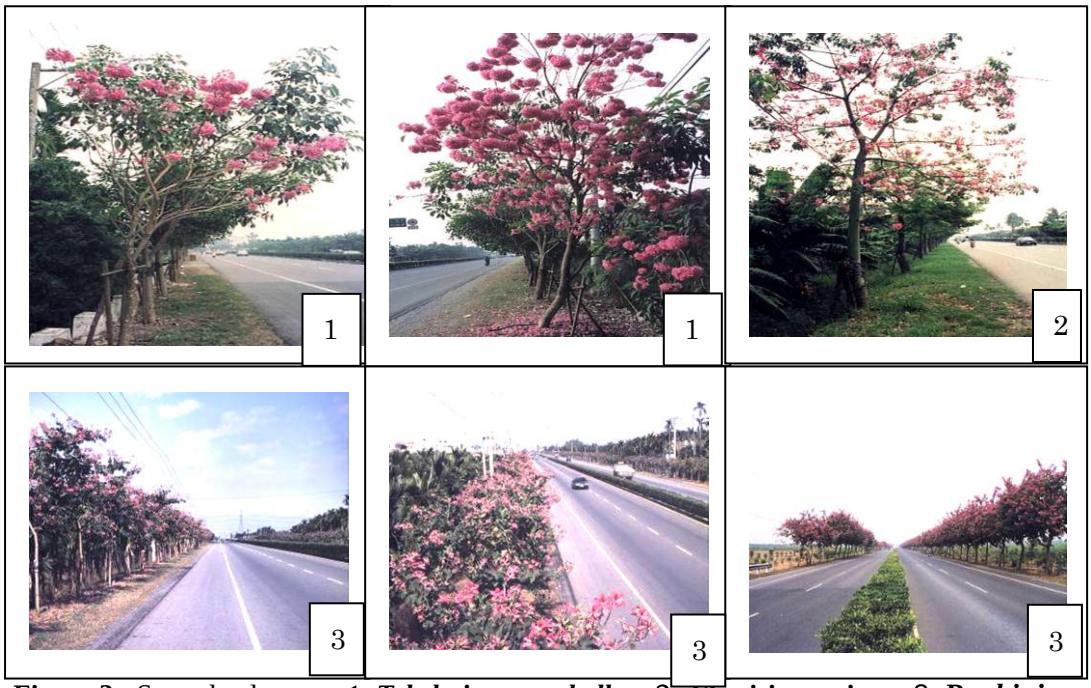

Figure 3: Street landscape—1. ***Tabebuia pentaphylla*** **2. *Chorisia speciosa*** 3. ***Bauhinia × blakeana***

Figure 4: Street landscape—Local folk features

Keyword: Species select，Ecocity，Landscape environment，Road landscape

A Site Evaluation Method and Questionnaire Survey concerning Geothermal Power Plant Construction

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1. Introduction

Today, the introduction of 100-percent domestic energy is proceeded in response to the serious problem of energy drying-up in Japan. Especially, the deposit of geothermal resources in Japan is ranked the third-highest in the world, and the future development is expected. However, subjects are left to be solved: promising areas are included in the statute designated area, hot spring use, and the cohabitation with local citizens. Therefore, the new geothermal power plants have not been built since 1999. The consistent valuation basis for geothermal power plants has not been established. While considering environmental preservation, establishment of the new method about the environmental impact assessment is demanded in order to perform better development.

In this study, the evaluation of site suitability method of the geothermal power plant which uses AHP and GIS was proposed for the purpose of the future promotion of geothermal power plants. And the local citizens' opinions and ideas about the geothermal heat were investigated by the questionnaire using CVM.

2. Examination method

2.1 The Proposal of a Evaluation of Site Suitability Method

In this study, the evaluation method of calculating the weight of evaluation items by using AHP, and of visualizing them in GIS was proposed (**Figure 1**). The 13 evaluation items were selected from the geothermal development promotion investigation report of NEDO (New Energy and Industrial Technology Development Organization).

This study checks whether the result of AHP could use widely to GIS data, and examines the evaluation of site suitability about an existing geothermal power plants by visualizing the weight using the mesh by GIS.

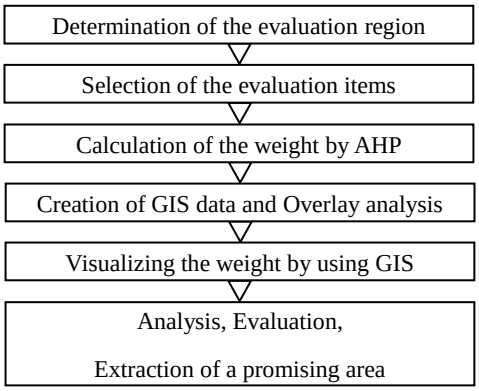

Figure 1: The flow of the evaluation method to propose

2.2 Attitude Survey of Local Residents

Citizens of promising area of geothermal heat and non-geothermal heat were questioned about geothermal plants. The residents are from Oguni, Aso, Kumamoto prefecture; and from Kokonoe, Kusu, Oita prefecture.

Questionnaire items are as follows: questions relevant to the knowledge of energy and electric generation, and those relevant to the social value of the geothermal plant and to personal information of answerers. Questions relevant to the social value of the geothermal plant are valued with CVM.

3. Results

The result of having calculated weight by AHP was 611.4 degrees when the difficult conditions of site were combined, whereas it was 122.4 degrees in the case of combining the possible conditions of site. Moreover, both natural treasure and cultural assets became the most important items.

Therefore, 2 places exceed 300 degrees in **Figure 2**. However, they were less than half of 611.4 degrees, the weight in the case of combining the difficult conditions of site. It is, thus, possible to build geothermal power plants in all these sites including two places mentioned above.

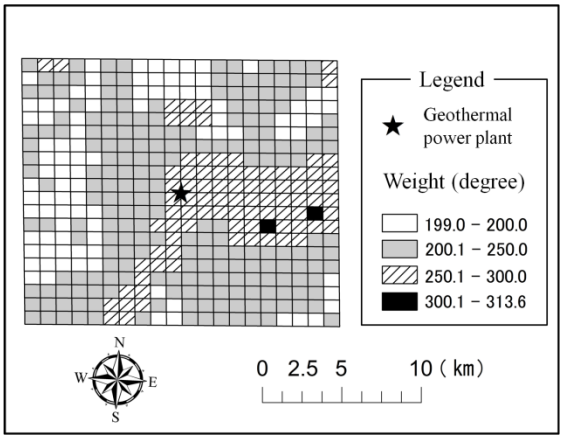

Figure 2: The example of weight distribution

Questionnaire survey started on Jul. 21, 2011 and picked 1,000 residents randomly from each area. Since questionnaire was posted, the collection rate was 28% as of Nov. 24, 2011.

As for questions relevant to ecology activities, 95% residents of promising area of geothermal heat and about 99% of promising area of non-geothermal heat practice ecology activities. This result is due to the mass media that has reported global warming and other environmental problems, which increased the public awareness of ecology.

The result of the question relevant to the social value of the geothermal plant is estimated willingness to pay, in each area (WTA) using CVM. WTA was calculated by Weibull distribution, which was equal to median. The social value of the geothermal plant is calculated by **Equation (1)**. The result is shown in **Table 1**. Since investigation cost and construction cost can cover by taxes, the geothermal plants are socially valuable.

WTA × the limited number of households that 20,000 kW of the geothermal plant can supply electricity

= the social value of the geothermal plant ・・・ **(1)**

Table 1: The social value of the geothermal power plant

area	WTA (yen/ household)	the limited number of households that 20,000 kW of the geothermal plant can supply electricity (hous]ehold)	the social value of the geothermal plant (billion yen)
promising area about geothermal heat	12,700	33,300	0.42
promising area about non-geothermal heat	11,800	33,300	0.39

4. Conclusion

This study proposed the evaluation of site suitability method of the geothermal power plant which used AHP and GIS. It became clear that the weight of the standard that the geothermal power plant can be built was from 200 to 250 degrees by making weight distribution. Therefore, it was checked that the evaluation of site suitability by the proposed method is possible.

The attitude survey on the cohabitation of plant developer and local residents including hot spring traders has been done by the questionnaire. Proposed estimation method is effective in the introduction of geothermal power plant.

Therefore, from the disastrous accident of the nuclear power plant by the East Japan great earthquake on Mar. 11, 2011 and our growing attention to exploitation of renewable energy, this study will serve as the promotion of the geothermal power plant.

Use of beetles in treating TFT-LCD wasted sludge

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Biosolids generated from a TFT-LCD wastewater treatment plant were further processed and treated by beetles. The treated biosolids contained trace amount of some regulated heavy metals, and were proposed to be used as a soil conditioner and/or fertilizer.

Biosolids production from the wastewater treatment plant of the TFT-LCD manufacturing sector increases over time. Currently the generated biosolids are treated either by landfill or by combustion, which either needs needs more land space or costs additional energy to process. Limited success was reported by using worms treating domestic biosolids, and others for reusing biosolids in different means. Here, we studied the potential use of various kinds of beetles in digesting and transforming the biosolids so that the further application of the treated biosolids could have rather environment-friendly usages.

By mixing the TFT-LCD wastewater resulted biosolids and cellulose-type substrate at 2:1 ~ 5:1 ratio, the mixed material could be consumed by various species of beetles. The Oryctes rhinoceros appeared to have highest FTR and feces production, showed no abnormal effect, and is deemed as the most feasible species in handling the TFT-LCD biosolids. Some heavy metals were detected, yet after the beetle consumption the heavy metal content in the feces reduced by one half, which indicated that ~50% of the heavy metals were adsorbed by beetles without releasing to the environment. However, a material balance study of the metals in the system is suggested. The treated biosolids equipped with certain fertilizer value and showed a better result in growing plants. No significant amounts of heavy metals were detected in plants. A large scale of test is preferred to further demonstrate the applicability of treating TFT-LCD

biosolids using beetles.

References

1-Hendrickx, T.L.G., H. Temmink, H.J.H. Elissen, and C.J.N. Buisman. *Aquatic worms eating waste sludge in a continuous system.* Bioresource Technology. **100**: 4642-4648. (2009).

2-Zhao, Limin, Yayi Wang, Jian Yang, Meiyan Xing, Xiaowei Li, Danghao Yi, and Dehan Deng. *Earthworm–microorganism interactions: A strategy to stabilize domestic wastewater sludge.* water Research. **44**: 2572-2582. (2010).

3-Hospido, Almudena, Marta Carballa, Maite Moreira, Francisco Omil, Juan M. Lema, and Gumersindo Feijoo. *Environmental assessment of anaerobically digested sludge reuse in agriculture: Potential impacts of emerging micropollutants.* water research. **44**: 3225-3233. (2010).

4-Tchobanoglous, Georage, Franklin L. Burton, and H. David Stensel. *Wastewater Engineering: Treatment and Reuse*. New York, McGraw-Hill, Inc. 1848. (2002).

5-Yang, Xiaoyi, Xin Wang, and Lei Wang. *Transferring of components and energy output in industrial sewage sludge disposal by thermal pretreatment and two-phase anaerobic process.* Bioresource Technology. **101**: 2580-2584. (2010).

Endeavor to improve tributary stream environments by the Floating Island with Wood Piles (FIWP)

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There are a lot of concrete channels in Japan. Many organisms dislike such channels. If there are "resource" and "assumption" which are for them, it is easy for many organisms to live. Floating islands generally give "resource" and wood piles give "assumption" by which to change the flow rate. Consequently, this study suggests floating island with wood piles which have both advantage and hopeful to restore tributary stream environment, simply and inexpensively. In this instance I'll discuss the difference of flow rate between before Floating Island is installed and after it.

1. Introduction

In the concreted tributary rivers in Japan, a good deal of river water can be directed. In contrast, the rivers lost habitat growing environment and impaired scenery. The surveyed river of this study is one such river. Inserting wood piles in the river is efficient to make the cay and ebb water route out of the anamnestic study. On the other hand, the artificial floating island is suspended the lake and the pond and creates the function of habitat and growing environment, water purification and landscape improvement. This study's purpose is to develop Floating Islands with Wood piles (FIWP) which have the advantages of both floating island and wood piles and to inspect its effects.

2. Material and Method

2.1 The surveyed river

The surveyed river of this study is The Takeda River in southern Chiba prefecture which has a total stream length of about 15km and a basin area of 16.7km^2. The investigation site is around the Machihara Bridge which is in the headwaters 4km from river confluence. The surveyed zone is 65m in length. The average water depth is 0.3m. The average river width is 3.6m. The average flow velocity is 0.41 m^3/s. And the gradient of water surface is 1/1700. The river had already had river improvement by concretes. We decided the installation location is in P6' downstream of the right bank.

2.2 FIWP

We developed FIWP by using materials that are inexpensive and easy to get because this study aims to be able to make it available to everyone. Refer to Figure 1 for the detailed dimensions. The method of anchorage was to make a connection between FIWP with reinforcing bar which was driven into river bed and fastened nylon rope.

2.3 Investigation summary

In this study, we compared stream regimes before the FIWP was installed and after it and we measured if the

environment was restored. We measured ecological environment which can separate resource and assumption. Especially, we measured if the flow velocity included in the assumption was improved.

3. Result

3.1 Function of spur dike

Figure 2 and 3 are the iso flow velocity line before FIWP was installed and after it. Previously, the line of flow was not definite and the flow was smoothing. However, Afterward, the line of flow becomes definite and scour power works more effectively. Furthermore, flow near the FIWP' slowed. Therefore, depositional work functions efficiently in the vicinity of P6+2m. Actually, the materials of the river bed have changed silt into gravel. Considering the circumstances mentioned above, it suggests that the smooth river bed changed into a primary river that has riffle, pool and water route.

3.2 Thickness appearance of P.japonica

Roots made an appearance from the intake port of FIWP. Therefore, it is favorable to cleaning water. Additionally, we encourage also many insects to live in FIWP. Thus, there is an active field to live and grow.

REFERENCES

[1]Kazuki Abukawa, Masaki Ohki and Yuuya Udeki 2000.小河川における水辺空間の創出について，第 34 回土木学会関東支部技術研究発表会講演概要集， Ⅱ-32

[2]Keigo Nakamura and Yukihiro Shimatani：人工浮島技術の現状とその機能，PWRI

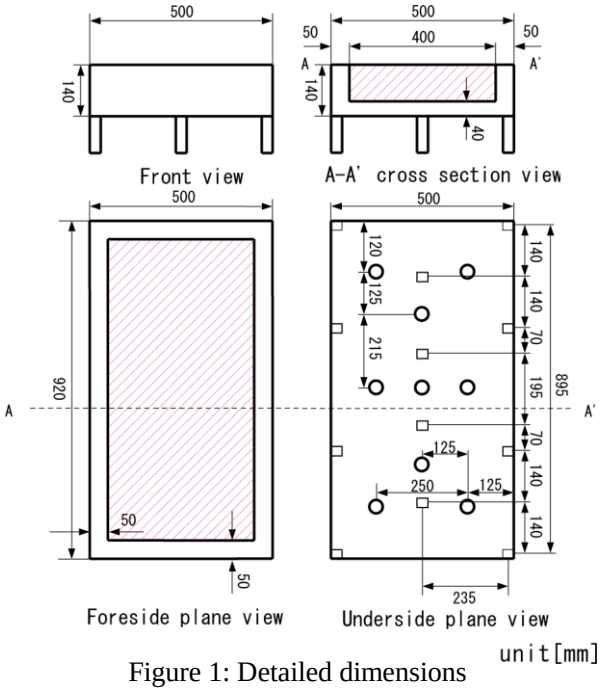

Figure 1: Detailed dimensions

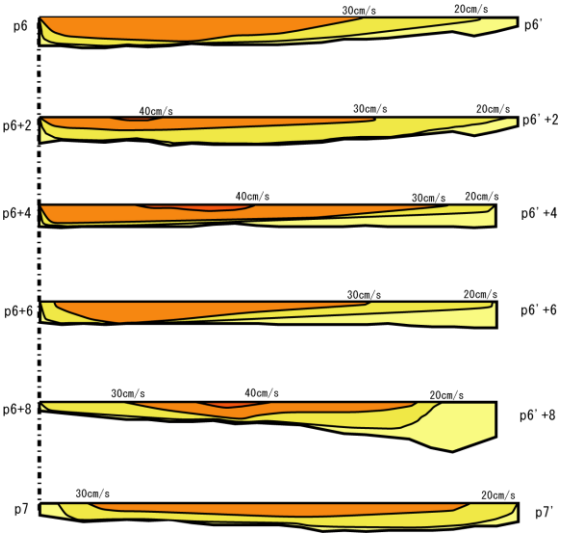

Figure 2: Before installation

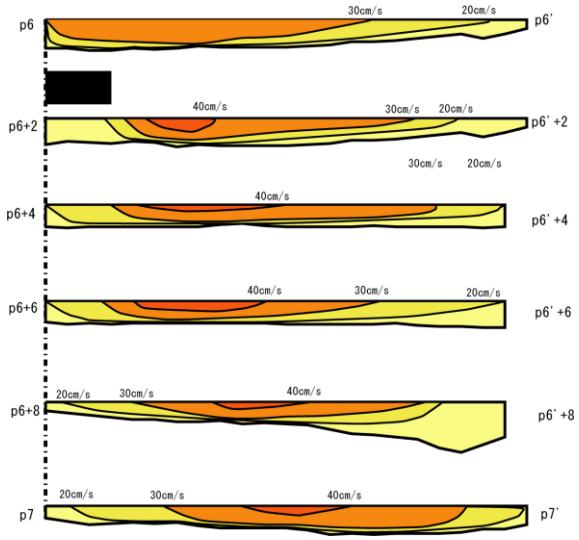

Figure 3: Soon after installation

Extraction of lipids from *Euglena* using underwater shock wave

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Abstract

As alternative petroleum, Biofuels from algae is attracted attention. Because Algae cultivation does not compete with food productions and the biofuels productivity are much greater than those of higher plants. In order to spread algal biofuels, we must make an effort of cost cutting. There are several possible solutions for cost cutting. For example, the optimization of culturing methods, exploration of the strain to produce more lipids, effective destruction of algal' cells. Generally the cell destruction uses ultrasonic disruptors. In this study, we used a new method which is the Underwater Shock Wave (USW) for the *Euglena'* cells destruction. USW is an impact wave generated from high electric potential in the water, followed by the destruction of the cells of the target materials. The *Euglena* is a type of algae. We compare the amount of extracted lipids resulted from the USW and the one from the ultrasonic disruptors method. As a result the amount of lipids extracted from the USW and the one extracted from the ultrasonic disruptors' method were respectively 1.8 times and 1.3 times the amount of lipids we have without proceeding to any experiment. In conclusion, we see that the amount of lipids extracted after the USW is greater than the one extracted after the ultrasonic disruptors' method.

Photograph 1 *Euglena*

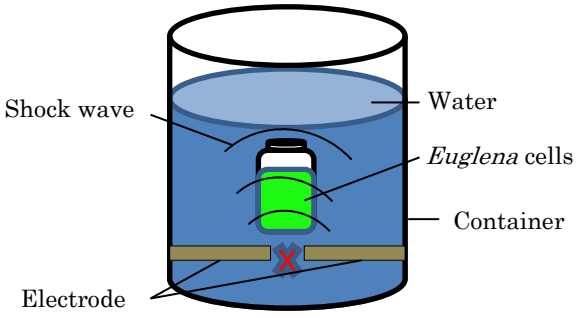

Figure 1 Underwater shock wave generator

References

[1]U.S.Department of Energy, 2010, National algal bio fuels Technology Roadmap, chapter 1

[2]H. Sakamoto, S. Kawabe, S. Itoh, 2010, High-speed behavior of glass bottles when using underwater shock-waves, WIT Transactions on the Built Environment, 98, 293-299.

Part II

Welfare

Brain Functional Signal Analysis using Near-Infrared Spectroscopy

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1. NIRS Signal Analysis using Variance Plot for Auditory Selective Attention

We proposed a separation method for the optical pathlength influence by the variance plot analysis using the variance of the sample mean to NIRS(Near-infrared Spectroscopy) time series signal[2][3]. As a validation example, we conducted the variance plot analysis on the auditory selective attention by 10 subjects of normal adult males. As a result, in 8 subjects out of 10 subjects for the auditory area on the left side and 7 subjects out of 10 subjects on the right side for auditory area, channels corresponded which are activated concentrating on listening to music.

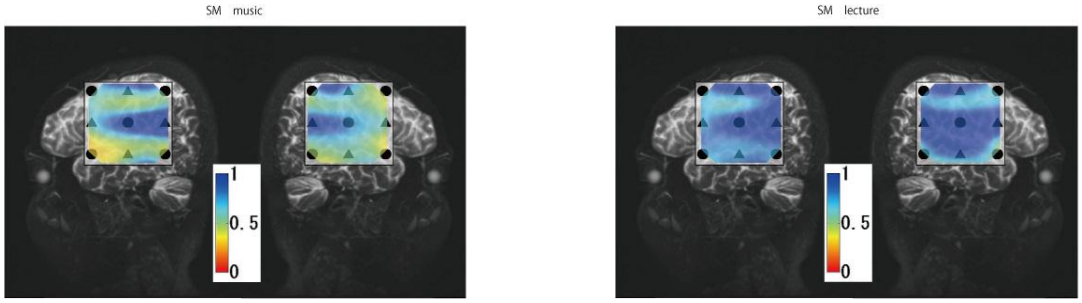

Fig.1 Variance plot analysis on auditory selective attention activated concentrating on listening to music and lecture.

2. NIRS Signal Analysis using Variogram for Subtraction Method

Recently, We proposed a separation method for the optical pathlength influence using the moving variogram analysis to NIRS time series signal[4]. As a validation example, we conducted the variogram analysis on the subtraction borrowing and without borrowing by 4 subjects of normal adult males. As a result, in 4 subjects out of 4 subjects for the interparietal sulcus on the left cereberum were activated by the subtraction borrowing.

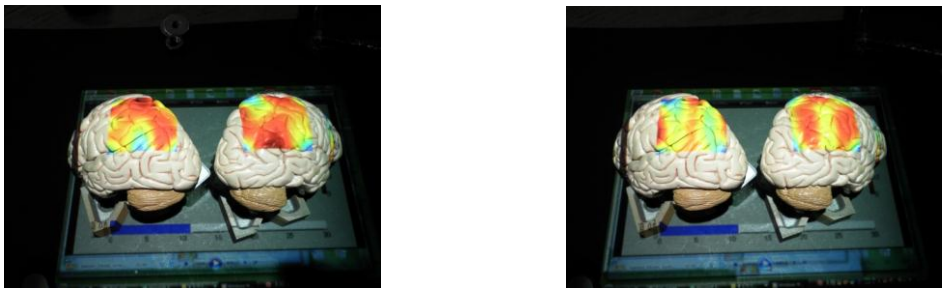

Fig.2 Brain color map of α value(subject:KA) using variogram against channels of OxyHb NIRS data for the subtraction borrowing of two digits(e.g. 16-8, 18-9, 10-5) and without borrowing of one digit(e.g. 5-3, 7-2, 8-5).

3. See-through Brain Observation Display

We have been developing see-through brain observation display for NIRS measurement[1][5]. It reconstructed the stereoscopic images from the MRI(Magnetic Resonance Imaging) DICOM(Digital Imaging and Communication in Medicine) data of the T2 method. These images displayed on 7.1-inch liquid crystal display to left and right eye. As a result of verifying for 50 subjects, the stereoscopic vision of the brain was possible to all people.

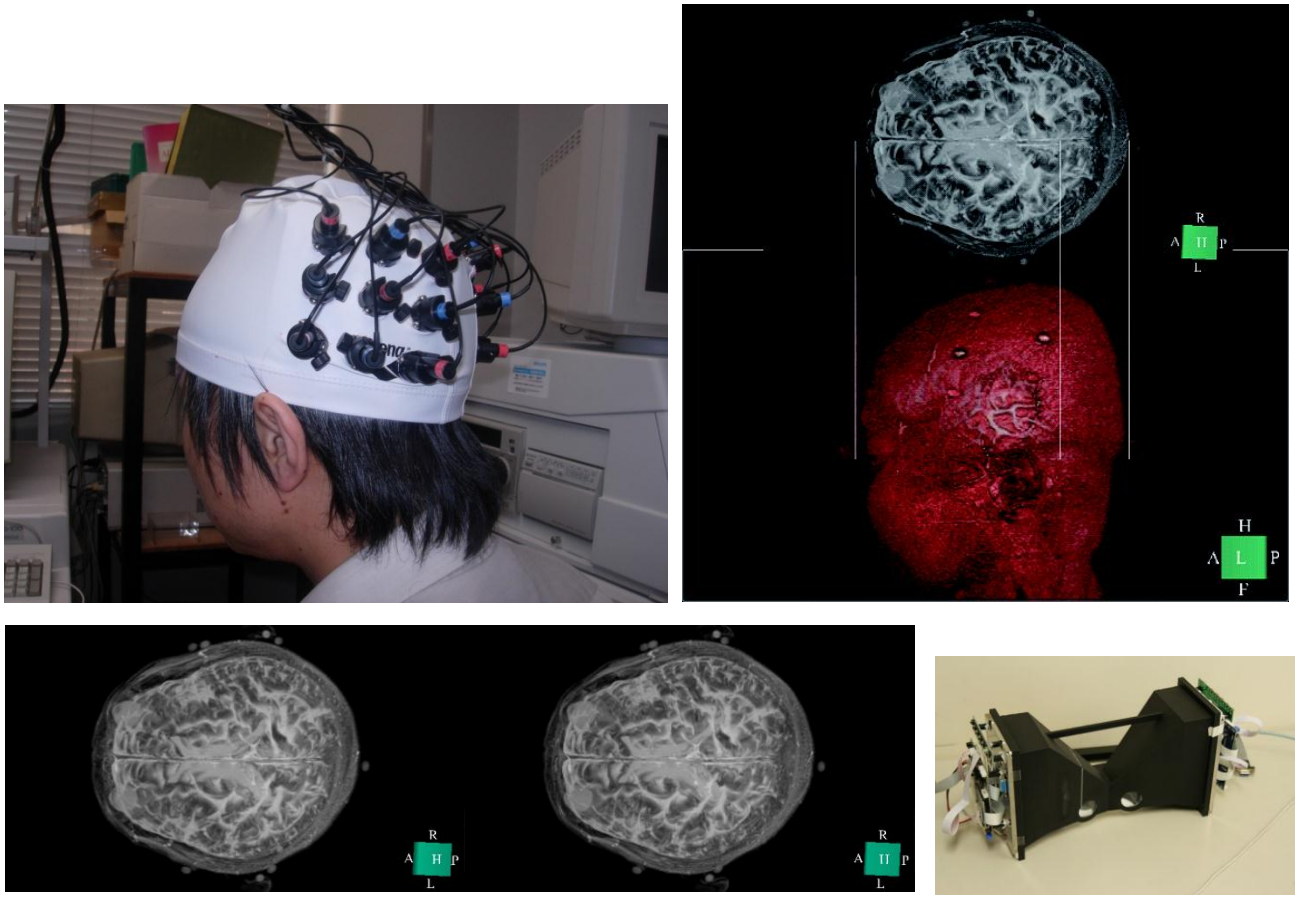

Fig.3 See-through brain observation display for NIRS measurement.

References

[1] S.Yamamoto, I.Kurimoto, H.Furumoto, S.Tachi, "Developmet of See-through Brain Observation Display," Journal of The Japan Association for College of Technology, Vol.13, No.2, pp.57-62, 2008.

[2] T.Takumi, I.Kurimoto, M.Nakagawa, "Interractive Brain Functional Analyzer for Nearly Infrared Spectroscopy," Journal of The Japan Association for College of Technology, Vol.13, No.2, pp63-68, 2008.

[3] I.Kurimoto, N.Kawakami, S.Tachi, "NIRS signal Analysis using Variance Plot for Auditory Selective Attention," Transactions of The Virtual Reality Society of Japan, Vol.14, No.3, pp.371-380, 2009.

[4] Y.Yoshida, I.Kurimoto, S.Tachi, "Development and Evaluation of Portable See-Through Type Stereoscopic Observation Display," Journal of the Japan Association for College of Technology, Vol.16, No. 3, pp.85-90, 2011.

Lumbar Motion Trace on the Walking with Loading a Backpack

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We usually use backpack when we go mountaineering or hiking. When we pack the baggage in backpack, it is said that putting heavy thing in high position will reduce fatigue, because burden on lumber and swing of backpack will reduce. However, we have just a few research of the effect on walking or lumber in carrying backpack. In this research, we consider the effect on lumber motion while walking by wearing backpack and changing center gravity position of backpack We use wireless three-dimensional accelerometer to measure lumber motion. Walking places are in level ground and steps.

Center gravity of human is in the little front of sacrum. Center gravity of a man is in the 56% of the height from his feet [1]. We can find out the position of sacrum easier than vertebra No.4 representing lumber, so we put accelerometer behind on the sacrum. Figure 1 shows a configuration of a measurement system. While walking, the signals of three-dimensional acceleration will be sent from the sensor unit wirelessly to the control unit, and the signals will transfer to a PC finally. Figure 2 shows the backpack we used in the experiment. The load used in the experiment is a sandbag weight of 5kg, height of 100mm. The weight of the backpack with no load is 0.5kg, ant the height of that is 400mm. We use polystyrene board to adjust height. Polystyrene boards are 0.2kg in total. We use 11 polystyrene boards to adjust the height of the load.

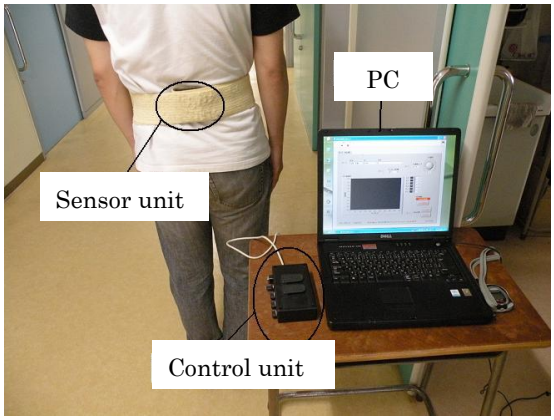

Fig.1 Measurement system configuration

Fig.2 Backpack used in the experiment

In the experiments at level ground, a subject person walks for 20m and collect the data of ten steps in the middle of stable region. Figure 3 shows a place of stair walking experiment. One step is 180 mm high and 300 mm deep, each subject person walks from point A, level ground, up 10 steps, level ground to point B and goes back to point A.

Figure 4,5 shows typical lumber motion of changing load position and walking stairs.

Figure 4 shows lumber motion trace comparison of changing the load position when walking level ground. The blue line is motion trace with no load, the yellow-green is motion trace with load in high position, red is motion trace with load in low position. When walking with carrying a backpack and the load is in high position, horizontal motion was smaller than walking with no load. When the load is in the low position. Vertical motion is bigger than walking in no load.

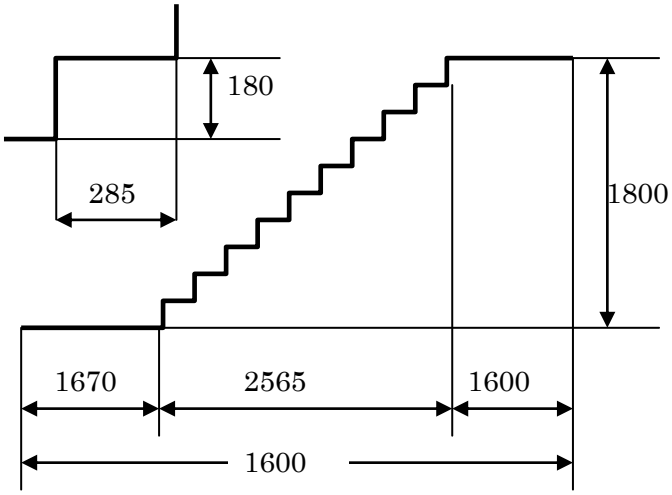

Fig.3 The place of stair walking

Figure 5 shows the result of the comparison of lumbar motion walking between level ground and stair with no load. Blue is motion trace in walking in level ground, yellow-green is motion trace in walking upstairs, red is motion trace in walking downstairs. When walking upstairs, horizontal motion of lumber is bigger than walking on level ground. In upstairs, there is a big value in horizontal motion of lumber, and the time when foot on the ground is longer than other walking.

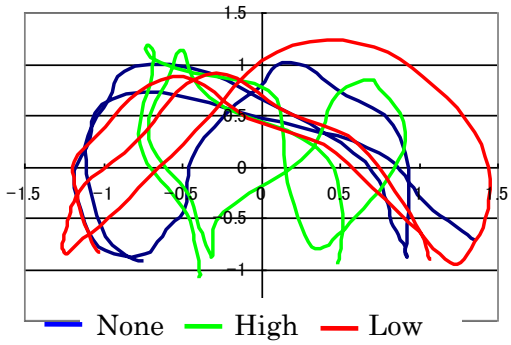

Fig.4 The loading differences on flat walking

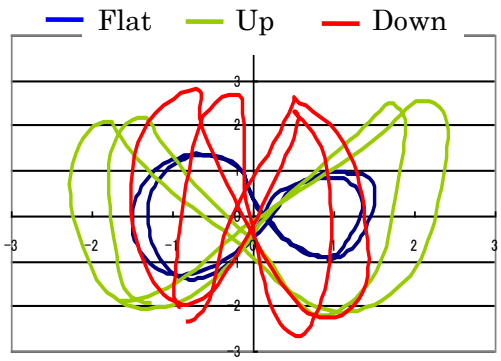

Fig.5 Comparison of the load in stair walking

In the experiments walking with carrying backpack on stair, there is no significant difference in vertical or horizontal motion as walking with no load and load position. But there is a trend that horizontal motion of lumber with lower place of backpack is bigger then walking with no load or load in high place.

In those experiments, we know the lumber movement is smaller when the load is in the high position, and can save energy. I think when the load is in the high position, center gravity of backpack get close to shoulder that support the weight of back pack, and that reduce the backpack to swing and stables the walk.

References

[1] Hiroshi Saito, Ryuichi Nakamura; basic kinematics, Ishiyaku publication(2000), p332, p361-366

The Study of the Welfare Needs and the Physical Condition of the elderly care sector in Miaoli County

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Abstract

The purpose of this study was to explore long-term care institutions for the elderly health, activities of daily living and living needs of the research in Hakka City. Mining quantitative research questionnaire designed to simple mental status questionnaire (Short Portable Mental State Questionnaire, short SPMSQ) first selected to access the object, a total of 31 elderly were studied. Another way to interview 18 interview the elderly, social workers, 3, and director of a hospital district.Research tools for the reference to other researchers of the questionnaires from the proposed "health self-assessment," and "activities of daily living ADL", "instrumental activities of daily living IADL" and "needs of life questionnaire for the elderly.Obtained the data to SPSS 12.0 version software package for statistical analysis. In the ADL, the average score of 80.32 points, an average of ADL difficulties for the elderly project 3. 38.7% of them have no difficulty in the study of the project is completely independent of the elderly. The most difficult items for the bath, accounting for 58.1%. This was followed by the option to get out of bed and up and down stairs, accounting for 41.9%. In the IADL, the average score of 10.48 points, each an average of IADL difficulties in project 2.29. 38.7% of subjects have no difficulty in the project. Which were fully accounted for 41.9% of single elderly people, the most difficult items for the use of phones accounted for 48.3%. This was followed by financial management, shopping, transportation options accounted for 29.0%. Demand for welfare measures for the elderly in eight projects, the answer is not needed for the majority, accounting for about 60% or so. With the highest scores for economic benefits 64 points, followed by health care 62 points , the third for psychological counseling with a score of 55 points. The use of social welfare services, the elderly Status of 20 projects, into the housing for the elderly welfare agencies with the highest scores of 61 points, followed by respect for the elderly living allowance being 32 points, the third for the elderly free health checks, a score of 23 points. Currently accommodated in long-term care institutions for the elderly in terms of health by the chi-square test revealed that the result of "gender", "origin", "use language", "religion", "having children" and "stay long-term care institutions for years," The differences were significantly different. Currently accommodated in long-term care institutions for the elderly in their daily life functions, t-statistical test and one-way ANOVA analysis found that because of "gender", "marital status", "having children" and "social welfare status" there were significant differences differences. Currently accommodated in long-term care institutions for the elderly needs in life, t-statistical test and one-way ANOVA analysis found that because of "educational attainment", "social welfare

status" of the differences were significantly different. The regression analysis found that the gender virtual variable activities of daily living for the elderly predictive power to achieve significant multiple correlation coefficient of 0.575, the coefficient of determination of 0.330, showing that the gender variable can explain the variance in activities of daily living for the elderly was 33%. The results of this study will help nurses, social workers and long-term care facility staff are aware of the long-term care facilities for the elderly's health, activities of daily living and living needs, as health care professionals and the Government to formulate a basis of social welfare policy.

Key words: elderly health, activities of daily living, needs

References

Cambois, E. & Robine, F.（1996）.An international comparison of trends in disability-free life expectancy.In Eisen, R.A. & Sloan, F.A.（Eds.）***,Long-term care:Economic issues and poicy solutions*.** Boston:Kluwer Academic Publishers.

Carey, Elise C. Covinsky, Kenneth E. Lui, Li-Yung MA, Eng, Catherine, Sands, Laura P. Walter, Louise C.,2008, "**Prediction of Mortality in Community-Living Frail Elderly People with Long-Term Care Needs.**" Journal of the American Geriatrics Society. 56(1):68-75.

Cavan,R.,Burgess.,Havighurst,R.J.＆Goldnammer,H.， 1949.*Personal adjustment in old age*.Chicago : Science Research Associates.

Cumming, E.&Henry, W.E. (1961). Growing old: the process of disengagement. New York: Basic Books.

Farran,C.J.（2002）,Family caregivers : A critical resource in today's changing health-zare climate.*Excellence in Clinical Practive*,3（3）,1-3.

Franklin, L. L., Ternestedt, B. M., & Nordenfelt, L. (2006). Views on diginity of elderly nursing home residents. *Nursing Ethics, 13*(2), 130－146.

Gill, T. M., Allore, H. G., & Han, L. (2006). Bathing disability and the risk of long-term admission to a nursing home.*Journals of Gerontology Series A-Biological Sciences & Medical Sciences, 61*(8), 821－825.

McCraken, A.（1987）.Emotional impact of possession loss.*Journal of Gerontological Nursing*,13（2）:14-19.

Mikhail,M.L.,（1992）.Psychological responses to relocation to a nursing home. *Journal of Gerotological Nursing*,18（3）:35-39.

Evaluation of the operability of a joystick mouse by motion measurement

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1. Overview

In recent years, engineering efforts have been made to support the communication of physically disabled children, such as the development of e-AT(electronic-and-information-technology-based Assistive Technology) equipment as a class aide in special schools for physically disabled children. As part of these ongoing efforts, the authors are developing a joystick mouse to assist the computer use of physically disabled children. When a conventional joystick mouse is used, mouse cursor has its movements restricted to just eight directions: up/down/left/right, and diagonal movements.

This research aims to improve the operability of such a joystick mouse, and investigates how increasing the number of possible movement directions of the mouse cursor may improve its operability.

2. Development of the Joystick Mouse

Figure 1 shows the joystick mouse developed for this experiment. The joystick mouse has three components: the joystick that is operated for the mouse cursor movement, the buttons that are operated for the mouse clicks, and the control box. When joystick was inclined, in the coordinate system of figure 2, the angle of the joystick incline with respect to the X-axis is expressed as x [deg], while the angle with respect to the Y-axis is y [deg]. The joystick mouse judges the course that inclined of the joystick from the direction of vector $\boldsymbol{v}$ which shown in Figures 2.

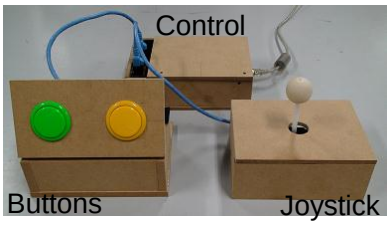


Figure 1 : Joystick mouse

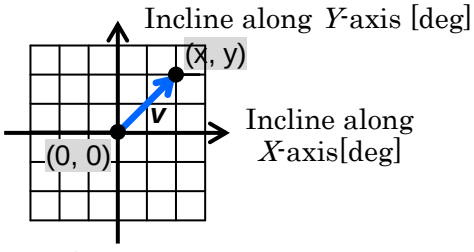
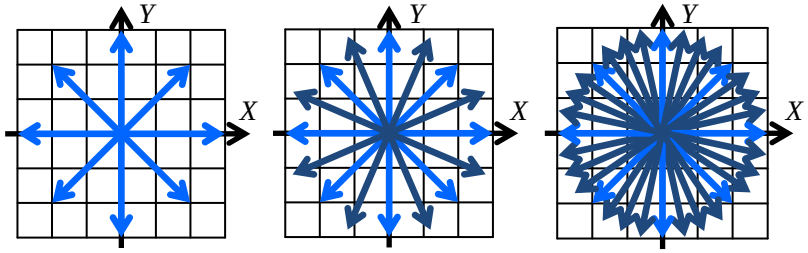


Figure 2 : Angle of joystick incline on a Cartesian coordinate system

3. Evaluation of the Operability of the Joystick Mouse by Motion Measurement

Experiments are conducted to assess the operability of the joystick mouse under the conditions where the number of possible directions of movement of the mouse cursor is 8, 16, and 32, as shown in Figures 3. The test subject is a physically disabled child (male, 10-year-old) suffering from paralysis in the upper limbs and involuntary movements. The joystick and the buttons are set in a location specified by the test subject, while the image shown in Figure 4 is displayed on the computer

screen. We give the subject a task which is to move mouse cursor from point ① to point ⑤ on the image (Figure 4) by operating the joystick mouse. The required time to complete the task is measured, as an indicator of operability. The moving distances of the back of the hand, wrist, elbow, and shoulder of the test subject are also measured, using an optical motion-capturing device, as indicators of the degree of upper-limb movement.



(a) 8-way case (b) 16-way case (c) 32-way case

Figure 3 : Possible directions of movement of the mouse cursor

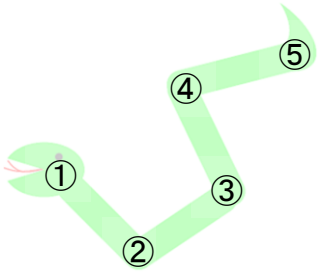
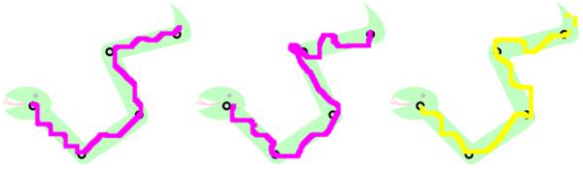


Figure 4 : Image used

The trajectories of the mouse cursor are shown in Figure 5, and the moving distances of the upper limb are graphed in Figure 6. Figures 5 and 6 show that the required time and the moving distance of the upper limb are shorter for the 8-way case compared to those for the 16-way case. Furthermore, the trajectory of the mouse cursor is relatively smoother for the 8-way case. From these results, we infer that smooth operation is done in the 8-way case, and increasing the number of possible directions that the mouse cursor can move does not improve its operability.

We considered the following factors to this result. Figure 5 shows that, compared to the 8-way case, the 16-way and 32-way cases do not have a clearly defined direction of movement. This observation suggests that erroneous operation increases because a condition that cursor can move in many directions is easily affected by the quiver of the fingertips caused by involuntary movements.



(a) 8-way case (b) 16-way case (c) 32-way case

Figure 5 : Trajectory of the mouse cursor

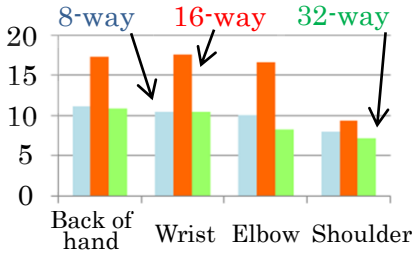


Figure 6 : Moving distance of the upper limb [cm]

4. Summary

In this work, we sought to improve the operability of a joystick mouse, and to this end, we investigated the effectiveness of increasing the number of movement directions of the mouse cursor. The results indicated that increasing the number of possible cursor movements does not directly improve the operability of the mouse, because a cursor that can move in many directions is easily affected by the quivering of the fingertips caused by involuntary movements.

Report on the damage from the Great East Japan Earthquake and volunteering

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1. Outline of Disaster

The Great East Japan Earthquake (GEJE for short) had begun at 14:46:18 on March 11, 2011 (JST), and had caused the tsunami of 15 m height at highest, which had attached coast area faced on the Pacific, not only of Japan but also of Indonesia. Still now after eight months passed, there remain heavy issues: reconstruction from the tsunami damages, and pollution by the nuclear reactor plants in Fukushima Prefecture, etc.

2. Comparison of damages with another recent earthquake

The Great Kanto Earthquake (September 1, 1923) and the Great Hanshin Awaji Earthquake (January 17, 1995) (GHAE for short) are the most remarkable disaster in Japan before GEJE. Here we describe the feature of damages by GEJE in comparison with GHAE. The comparison is summarized in Table 1. There are some remarkable points:

(i) The number of injured at GEJE is less than one at GHAE while the number of dead at GEJE is greater than one at GHAE.

(ii) The number of missing persons at GEJE is quite greater than one at GHAE.

(iii) The ratio of the total financial damage to the state budget increased twice from GHAE.

(iv) Earthquake intensities in JMA scale are same in spite of large difference in the moment magnitude.

(v) The ratio of damaged land area at GEJE to GHAE is estimated to be 5 at least. On the other hand, the maximum number of the refugees at GEJE is about 1.3 time of GHAE.

(vi) Nuclear Reactor Plants

Table 1: Comparison of two recent eqarthquakes

	GEJE	GHAE
Date	1995/1/17	2011/3/11
Energy of Earthquake Moment Magnitude	7.3	9
Strength of Earthquake in JMA scale	7	7
Damaged Prefecture	Hyogo	Iwate, Miyagi, Fukushima
Number of Dead	6,434	15,839
Number of Missing	3	3,647
Number of Injured	43,773	5,950
Maximum Refugees	>310000	>400000
Damaged houses	249,180	309,966
Total financial damage/ State budget [JPY]	10^13/ 7×10^13	2×10^13/ 8.5×10^13
Other Issue		Nuclear Plants

The location of the epicenter and tsunami reads the differences between them. For GHAE, the epicenter is located at the city area and caused many refugees while, for GEJE, the epicenter is located in the sea are, caused tsunami.

3. Volunteering

The number of volunteers is about 300,000 in total. The activities contain removal of rubble by tsunami, removal of sand and soil from houses damaged by tsunami, and transportation of goods. Volunteers include every kind of medical specialists. The author had also volunteered for totally a month as a temporary member of Japan Red Cross. Namely, the activity ranged over

- packing of blankets for the damaged area (two days after the first shock),
- packing of goods for the damaged are (3weeks after the first shock),
- removal of rubble, sand and soil from houses, and other administrative working.

4. Personal observation and impression by volunteering

The most impressive fact is that the local medical staff or the local specialists for welfare, who were also damaged, worked for other damaged people. A female volunteer talked “my house was lost, my mother and father were lost, and my friends so”, but devoted herself to helping other someone with a bright smile continuously. A hospital staff had kept to work for some weeks without going home because he thought medicine must not stop.

Removal of rubble, sand and soil was also hard. Atmosphere smelled sludge, the air temperature was low. Namely the condition was very bad. As it tends to warm, sludge were drying, and so stirred up. It was bad for health of volunteers.

5. Conclusion

The damaged area by GEJE is very wide. Therefore, it was difficult to provide accommodation for volunteers. Planning of volunteering and its organization are also important as well as volunteering itself.

Photography 1: Inside a house

Photography 2: Assembly of volunteers

Study on takeover support of visual information for special-needs school student

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1. Introduction

In the field of the special schools for physically handicapped children, the grasp is important with the field of vision of the child. According to Saito and Osaki (2008), physically disabled child is considered often have also a visual impediment (1), it is essential to offer educational assistance to student that to know the status of theirs. However, the visual actual conditions differ by every student, and since there is a student for whom it is difficult to take communication, the teacher is teaching by grasping each range and state of a student view with feeling. Therefore, method of showing teaching materials may be wrong. So, this study aims at making it clear [from sight data] about the point with which the difference in the point which observes a student from the existence of the relation to a student, and the teacher of a special-needs school observe a student. In order to check whether a difference appears as a pilot survey in the point to a student which is concerned and therefore observes a student, the eye mark recorder was used, and it is with the teacher of a special support school, and ordinary students, I had you view and listen to the video on which the student's appearance was recorded, and it compared the view line in that case this time. Furthermore, in order to acquire the information on how the teacher of a special-needs school has judged whether the student has recognized the mark in view assessment, the look of the teacher who is observing the student was recorded.

2. Observation of a pupil of special-needs school

In order to check whether a difference appears in the point to a student which is concerned and therefore observes a student, by one teacher of a special support school, these two school teachers, and one student, it was made to view and listen to the animation on which the student's appearance was recorded in the state where it equipped with the eye mark recorder, and the look in that case was compared. As a comparison result, a stoppage point of a special-needs school teacher and this school student is shown. As for the visual line of a special-needs school teacher, each point understands that they stop more than constant time. It turns out that a student's look is diffused in the wide range and it has stopped to it only for a short time. One person of this school teacher's result was the same result as a student. Since one more person was knowledgeable in advance, she brought the same result as a special-needs school teacher. The teacher who understands the point to observe from these results observed the regular point, and it turned out that those unrelated waver in the point to observe and it cannot be observing firmly.

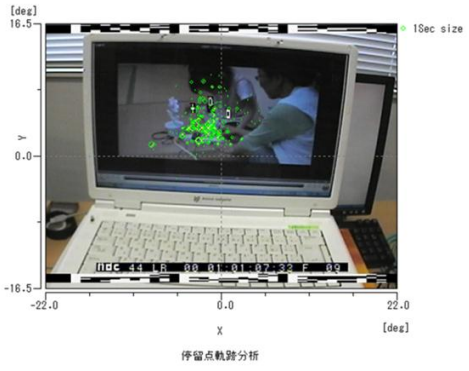

Fig1. Gaze point of student

3. Eyes analysis of a teacher in field of vision assessment

Next, in order that a teacher might investigate whether it is judged that the student is seen, seeing where from a teacher's look information, the experiment which extracts the look of the teacher at the time of measurement at the time of view assessment was conducted. The "view assessment" currently performed in the special support school is investigation which measures a student's view roughly. The technique is a thing of a teacher moving what serves as a mark from a student's back, and getting the visible position to reply to a student. In order to perform this, two persons, the teacher who moves a mark, and the teacher who observes a student, are needed. There is one student who performed view assessment this time. The student has eye squinting and it is seeing the thing by left eye predominance. Assessment was performed using the index which carried out the form of the character so that a student might be seen easily. The teacher who observes a student was put an eye mark recorder, and the view line was recorded. A stoppage point analysis result is shown as a result of the view line under a teacher's observation. Although the teacher was mainly looking at the student's right eye, it turned out that cautions are turned also to a mouth a right eye and by turns. However, from this eye mark data, a fine motion cannot be observed and it is thought that changes of a student's expression, etc. are overlooked.

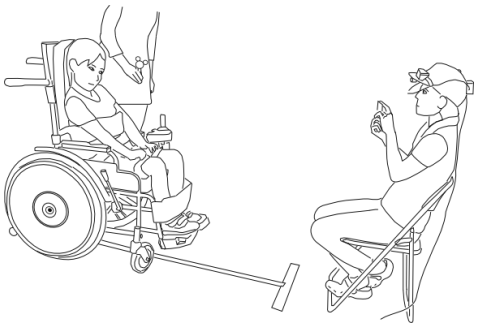

Fig2: State of the visual field assessment

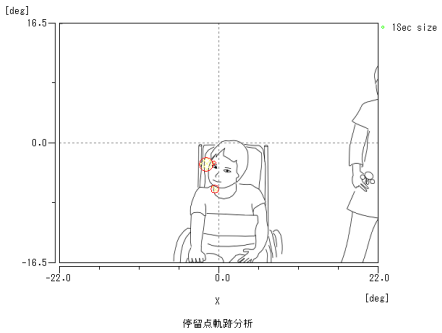

Fig3: Teacher's line of sight examples of data

4. Conclusion

In this study, the look of the teacher who observes a student for the purpose of making clear from view line data the difference in the point which observes a student was measured. The difference in the point observed by relation by a student or the existence of prior knowledge from those results was able to be checked. However, a measurement experiment needs to be improved for extraction of the point judged that the student is seen from a teacher's view information.

References

[1] Yumiko Saito, Hirofumi Osaki others, "Assessment of children with multiple disabilities research thematic research report 2006 - 19 years - focused on understanding and communication of environmental self-care activity -", National Institute of Special Needs Education, IAA, 2008. P5-6

Development of an automatic turning device for the manual wheelchair

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Kagawa National College of Technology

1. Introduction

In recent years, since the population of elderly people in Taiwan and Japan have been increasing[1,2], users of wheelchairs and accidents with operation of them have also been increasing[3]. Generally, wheelchairs can be divided into two types, Manual Wheelchairs (MW) and Electric Wheelchairs (EW). Despite EW being useful and safe for beginners and elderly people, most of these people use MW because its cost and weight are less than EW. For these people, the safe self operation of MW needs a skilled technique and a lot of experience in operating MW. The operation of turning is especially difficult and dangerous, because the user cannot look backward well.

For this problem, in this paper, we propose an Automatic Turning Device (ATD) that can be attached to any MW, that satisfies Japanese Industrial Standards (JIS). Realizing the ATD which can achieve turning automatically MW at the local area is expected to reduce the inconvenience and the dangerousness for users of MW.

The proposed ATD uses a ball-screw as the source of power, since the ball screw has a characteristic which can realize two movements (translatory movement and revolving movement) by the single motor. From this characteristic, we apply the translatory and the revolving movements to lift and turn MW, respectively, in order to realize the lifting and the turning MW by the single motor.

2. Aim of the Proposed ATD

The proposed ATD has developed as to satisfy the following specs.

- It can achieve MW pivot-turns safely and easily with single-handed operating.
- It is attachable to any MW which satisfies Japanese Industrial Standards (JIS).
- It is low-cost and light-weight.

Target users of ATD are inexperienced users of MW, e.g., elderly people, beginner users and temporarily users. Proposed ATD can realize reducing some difficult and dangerous troubles for MW users on daily usage.

3. Structures of the Proposed ATD

Proposed ATD as depicted in Fig.1,2 is constructed by a ball-screw and a brake. Because a nut on the ball-screw can be a translatory movement with a revolving movement of the shaft of it, we use the ball-screw as a source of power so as to lift and rotate MW simultaneously, that is,

- Translatory movement: lifting up or descending down MW
- Revolving movement : turning MW

The shaft of the ball-screw is connected to a motor (A in Fig.2) which is set on the base (B in Fig.2) of ATD, and the nut of the ball-screw is connected to the frame of MW through a connector (C in Fig.2). This connector is

constructed by using a ball-bearing in order to transmit only the force of the translatory movement, that is, the force of the revolving movement cannot be transmitted to MW. When MW must be turning, the force of the revolving movement can be transmitted to MW by holding the shaft of the ball-screw using the brake (D in Fig.2) connected to the frame of MW.

From characteristics of the ball-screw, if MW needs to turn to desired directions clockwise, the brake must hold the shaft of the ball-screw, when ATD is descending MW down. By contrast, if MW needs to turn counterclockwise, the brake must hold the shaft, when ATD is lifting MW up.

Figure 1: Picture of the proposed ATD

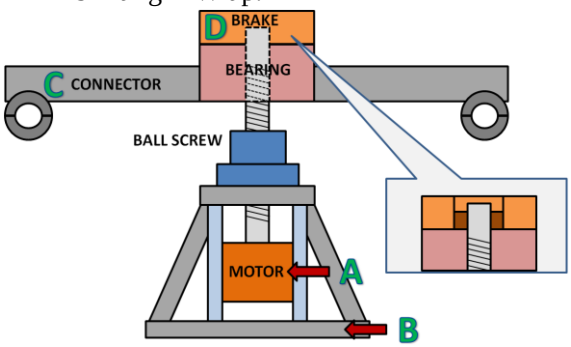

Figure 2: Structures of the proposed ATD

4. Flow of Turning Operatio1ns

A flowchart of turning operations in ATD are shown in Fig.2, where, operations of each step is described as follows:

(1) Input a desired direction angle.

(2) In order to lift up MW a little, revolve the ball-screw by the motor. (Use the translatory movement of the ball-screw.)

(3) If inputted desired direction angle is set at the ranges from 45 degree to 180 degree then go to (4). Otherwise, go to (5).

(4) Turn MW clockwise by holding the shaft with the brake when MW is descended down, and release the brake at the moment it is reaching to the desired direction angle.

(5) Turn MW counterclockwise by holding the shaft with the brake when MW is lifted up, and release the brake at the moment of reaching to the desired direction angle.

(6) Bring back ATD to default position.

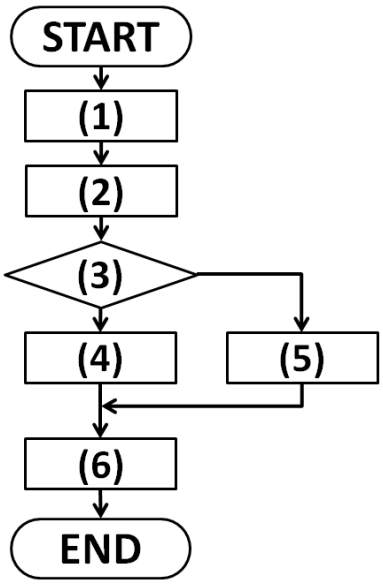

Figure 3: Flow of turning operation

5. Conclusion

In this paper, we propose an Automatic Turning Device for a Manual Wheelchairs using a ball-screw. Now, we finished building up a prototype device with a basic operating board. In the future study, we intend to improve the operating board of the prototype.

References

[1] http://www.stat.go.jp/english/index.htm, Statistics Bureau Home Page

[2] http://sowf.moi.gov.tw/stat/month/m1-06.xls, Resident Population by 5-Year, 10-Year Age Group, (In Chinese)

[3] National Consumer Affairs Center of Japan, 2001, Report about Accident of the wheelchair,(In Japanese)

Development of a Support Device for Digital Cameras using Adaptable Design for Challenged Persons

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1. Introduction

Recently, the social advancement of challenged persons is remarkable. For instance, universal design that is easy for anyone to use has infiltrated many aspects of our daily life. We can see it in various things such as spoon, PC mouse and slope.

However, many of them are difficult or impossible to be used as universal design. For example, let us look at "digital camera". It is difficult for a challenged person disabled in the upper limbs to use a digital camera. The main reason for the difficulty is that handicap is different in degree, kind and part from person to person. So it is impossible to consider all of them from the point of view of universal design.

In this study, we regard handicap as a person's character, and have developed control board (CB) compatible with various characters by using adaptable design and applied it to a support device for digital cameras.We brought the support device that we developed to Kyoto Prefectural Rehabilitation Center for Children in Maizuru. We got various opinions by demonstrating it to challenged persons. We made sure if a challenged person can take a photograph by using it. Our aim is to develope a more practical device by repeatedly exchanging opinions and incorporating them into the device.

2. The adaptable design

The adaptable design can accommodate itself to personal request easily without a change in structure or material and satisfy the conditions of accessibility[1)]. For example, a kitchen table whose height can be adjusted, a counter or a cabinet which can make space for the knee as occasion demands, and so on.

3. Design of our system

We regard handicap as a character, and have designed the device to bring out the potentiality of a challenged person at a maximum by making the most of the character.

3.1 Designing with adaptable design

We have adapted the adaptable design to adjust this system to various characters (ex.voice, touch, big motion and Etc.) . It will be a versatile system by adjusting input device that detect motion to various characters.

We considered three points when we design a CB system. First, it is easy to change the input device. Second, with this system a challenged person can take a photograph by using almost any compact digital camera. Third, it is easy for us to design input device.

3.2 The method of photography

We define photography as series of action comprising movement, focusing, and releasing the shutter. The device turns to each action each time it receives input from sensor or switch. So it enables us to take a photograph with a single action.

3.3 Design of support device for digital cameras

Figure 1 shows our structure of system. Support device for digital cameras that we developed consists of input part, CB and shooting part. Shooting part is made up of a motor to turn a camera, servomotor to release the shutter and a fixture to attach camera. Figure 2 shows the support device for digital cameras which we actually developed by ourselves.

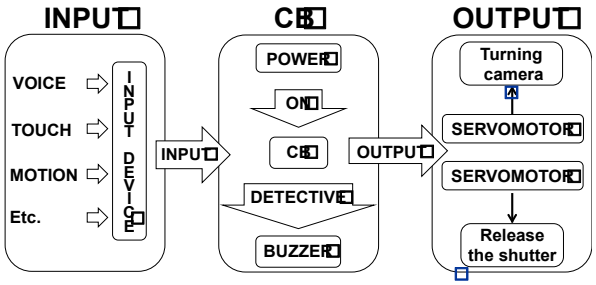

Figure 1:Structure of system

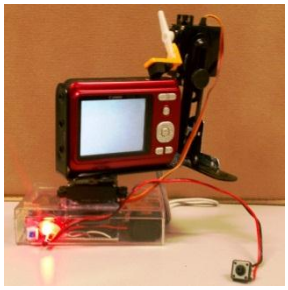

Figure 2:Support device actually made

4. The opinion of a user

As a result of trial test, a person who suffers from a disability in the upper limbs could take a photograph by operating the support device. We have asked the person to use the device and received the following opinions.

(1) It is likely to break when one fixes the case for storing CB on a stand.

(2) It is difficult to release the shutter when the fixing position of the camera has shifted.

(3) The part for releasing the shutter is apt to come off.

5. Conclusion

In this study, we have regarded handicap as a character, and developed a CB compatible with various characters by using adaptable design and applied it to a support device for digital cameras.

As a result of trial test, a person who suffers from a disability in the upper limbs could take a photograph by operating support device on their own. The person was delighted to take a photograph. We will continue to improve the product taking users's opinions into account and aim to produce a commercial version.

Reference

[1] The universal design seminar, 2003, "The manufacturing which was paid in super old times", pp. 7-8, Japan Industrial Publishing Co., Ltd. (in Japanese).

Generalize ICT-based Scenarios for Decreasing the Incidence of School Bullying by Leveraging Technology Foresight Approaches

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Forward-thinking governments and companies have significantly recognized Greentech and Orangetech (GO) services in conjunction with ICT-enabled intelligence. As general understanding, Greentech is a means of utilizing associated technologies to sustain natural environments; on the other hand, the purpose of Orangetech is to provide useful applications to take care of human-centered ecosystems. Nowadays, ICT technologies capable of machine intelligence are increasingly adopted to advance the performance of GO services. Such ICT-enabled intelligent GO service, so called iGO, is able to not only realize sustainable developments but also enhance quality of life for people meanwhile create new opportunities for economic growth. However, because of the characteristic of sustainability, iGO applications have to be designed with concerning present needs and future ones. For such purpose, Technology Foresight is therefore considered. The concept of Technology Foresight (TF) is to discover the relationships between current trends and future visions for the aimed topic. TF approaches have been widely used to help sketching development roadmap of emerging technologies and innovating planned services.

In recent years, the issue of School Bullying (SB) has received great importance of general people in the world. There have been numerous discussions and research findings for example published academic papers, project results, theses, commercialized products or services, etc aiming at decreasing the incidence of SB events via applying new methods as well as creative ideas. Unfortunately, most of these existed approaches commonly presented their distinct SB-defense thoughts but rarely introduced considerable scenarios which play a critical role of analyzing the essence of SB. To clearly examine the characteristics of SB-defense and to figure out the possibility of applying ICT-based solutions for SB-defense, this study generalizes an application scenario for SB-defense on the strength of several existed TF approaches through a series of convergence and divergence process. In short, the result of this study in a scenario-description fashion can not only address implications about SB-defense, but also indicate valuable directions for stakeholders to design further actionable initiatives.

Appendix

Appendix A: Program

Time (chair)	min	ID	Name	Affiliation	Title
9:30-10:00					Registration
Dec 10 10:00 - 11:35 (Sekiguchi)	5	S01	Lung-Sheng Lee 李隆盛	President of National United University 國立聯合大學　校長	Opening Address
	5	S02	Toshio Kudo 工藤敏夫	President of Kisarazu National College of Technology 木更津工業高等専門学校　校長	Opening Address
	30	S03	Wan-Chang Hsiao 蕭万長	Vice President of ROC 中華民国　副総統	(speech)
	5	S04	Masato Kitani 木谷 雅人	Director of Institute of National Colleges of Technology 国立高等専門学校機構　理事	(speech)
	5	S05	Shih-Chang Lee 李 世昌	Counselor of Bureau of International Cultural and Educational Relations Ministry of Education, ROC 中華民国教育部 国際文化教育事業処　参事	(speech)
	5	S06	Chen-Pang Liu 劉振邦	Deputy Director of Green Energy and Environment Research Laboratories Industrial Technology Research Institute 工業技術研究院 綠能與環境研究所 副所長	(speech)
	20	E00	Ching-Chih Lai 賴慶智	Green Energy and Environment Research Laboratories Industrial Technology Research Institute 工業技術研究院 綠能與環境研究所	Plenary Lecture "Research for quality living environment in Taiwan"
	20	W00	Ikusaburo Kurimoto 栗本 育三郎	Department of Information and Computer Engineering Kisarazu National College of Technology 木更津工業高等専門学校 情報工学科	Plenary Lecture "Brain functional signal analysis using near-infrared spectroscopy"
					Photography
12:00-13:20					Lunch

Time (chair)	min	ID	Name	Affiliation	Title
Dec 10 13:20 - 15:10 (Lin)	10	W02	Kyotaro Kikuchi 菊池 恭太郎	Kisarazu National College of Technology 木更津工業高等専門学校	Lumbar motion trace on the walking with loading a backpack
	20	W07	Jen Shu 徐　楨 Chih-Hsu Hsien 謝智旭	National United University 國立聯合大學	The study of the welfare needs and the physical condition of the elderly care sector in Miaoli County
	10	W04	Sho Gushiken 具志堅 翔	Okinawa National College of Technology 沖縄工業高等専門学校	Operability improvement of the joy-stick by the sensitivity adjustment of the lever
	10	W01	Takeru Donomae 堂野前 健	Kisarazu National College of Technology 木更津工業高等専門学校	Report on the damage from the Great East Japan Earthquake and volunteering.
	20	W08	Chen-Heng Hsu 徐振恆 Kai-Rung Jiang 江凱榮	National United University 國立聯合大學	Generalize ICT-based scenarios for decreasing the Incidence of school bullying by leveraging technology foresight approaches
	10	W05	Shuhei Takara 高良 修平	Okinawa National College of Technology 沖縄工業高等専門学校	Utilization support of the switch-material by stimuli
	20	W06	Takahiro Fujikawa 藤川 貴広 Misuzu Chujo 中條　文鈴	Kagawa National College of Technology 香川高等専門学校	Development of an automatic turning devices for manual wheelchair
	10	W03	Ryoji Yukino 雪野 瞭治	Maizuru National College of Technology 舞鶴工業高等専門学校	Development of a support device for digital cameras using adaptable design for challenged persons
	30				Break

Time (chair)	min	ID	Name	Affiliation	Title
Dec 10 15:40 - 17:00 (Ishide)	20	E10	Yu-Ping Chen 陳玉萍 Yating Hsu 許雅婷	Cheng Shiu University 正修科技大學	Synthetic lightweight aggregates made from reservoir sediments
	10	E01	Ryoji Hayashi 林 亮二	Kisarazu National College of Technology 木更津工業高等専門学校	Effects of antimony doping in CdTe solar cells
	20	E11	Nai-Jen Lee 李乃任 Shiuan-Jung Chiou 邱炫鐘	Chung Chou University of Science and Technology 中州科技大學	The lipid-lowering effect of different fractions of supercritical fluid extract of Pinus morrisonicola Hay *in vitro*
	10	E06	Reyes Tatsuru Shiroku 白久レイエス樹	Okinawa National College of Technology 沖縄工業高等専門学校	Development of the actuator concentration type removable underwater manipulator
	20	E13	Wei-Lun Lee 李偉綸 Yao-Yu Xie 謝曜宇	National Kaohsiung First University of Science and Technology 國立高雄第一科技大學	Study of light-driving reactions in oxidizing organic pollutants in liquid
18:00 - 20:00 (Sekiguchi)	1		Kisarazu National College of Technology 木更津工業高等専門学校		Banquet with Introduction of Institutes
	1		National United University 國立聯合大學		
	1		Kagawa National College of Technology 香川高等専門学校		
	1		Cheng Shiu University 正修科技大學		
	1		Maizuru National College of Technology 舞鶴工業高等専門学校		
	1		National Kaohsiung First University of Science and Technology 國立高雄第一科技大學		
	1		Okinawa National College of Technology 沖縄工業高等専門学校		
	1		Chung Chou University of Science and Technology 中州科技大學		

Time (chair)	min	ID	Name	Affiliation	Title
Dec 11 9:00 - 10:10 (Ishide)	20	E02	Naoki Ikeda 池田直生 Teppei Natori 名取哲平	Kisarazu National College of Technology 木更津工業高等専門学校	The activity of KNCT on down-flow hanging sponge reactor
	20	E09	Chen-Wei Tan 譚振偉 Tz-Ting Wang 王姿婷	National United University 國立聯合大學	Recycle of fly ash and sludge for producing value-added ceramic tile
	10	E05	Yui Moriwaki 森脇由衣	Maizuru National College of Technology 舞鶴工業高等専門学校	Study of UV irradiation effects in CR-39 plastics for environmental radiometry
	20	E12	Wen-Sheng Lin 林文聖 Ki-Lung Lin 林琦龍	Chung Chou University of Science and Technology 中州科技大學	The examination of vegetation on trees species and road landscape shape
	30				Break
10:40 - 11:50 (Wang)	20	E08	Ryuji Matsuoka 松岡　龍司 Kazutomo Matsushita 松下　和朋	Kagawa National College of Technology 香川高等専門学校	A site evaluation method and questionnaire survey concerning geothermal power plant construction
	10	E07	Chihiro Kishaba 喜舎場千尋	Okinawa National College of Technology 沖縄工業高等専門学校	Study on wax-ester extraction from *Euglena* using underwater shock wave.
	20	E14	Bo-Xuan Chou 周伯壎 Hong-Chun Chen 陳弘全	National Kaohsiung First University of Science and Technology 國立高雄第一科技大學	Use of beetles in treating TFT-LCD wasted sludge
	10	E03	Tsubasa Naganuma 永沼 翼	Kisarazu National College of Technology 木更津工業高等専門学校	Endeavor to improve tributary stream environments by the Floating Island with Wood Piles (FIWP)
	5	S07	Huey-Jiuan Lin 林惠娟	Dean of the Research and Development Office, National United University	Closing Address
	5	S08	Masayoshi Sekiguchi 関口 昌由	Chief Organizer of the Symposium	Announcement

Appendix B. List of participants (with local expression)

Special Guests

Wan-Chang Hsiao, Vice President of ROC
蕭 万長　中華民国副総統

Shih-Chang Lee, Counselor of Bureau of International Cultural and Educational Relations Ministry of Education, ROC
李 世昌　中華民国教育部国際文化教育事業処参事

Masato Kitani, Director of Institute of National Colleges of Technology
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Ki-Lung Lin	林 琦龍

Appendix C. Japanese version of the preface by President Kudo †

日台青少年シンポジウム
「環境保全と福祉向上のための研究成果発表と活動実践報告」2011　挨拶

木更津工業高等専門学校　校長　工藤敏夫

日台青少年シンポジウム「環境保全と福祉向上のための研究成果発表と活動実践報告」2011 の開催に当たり、ご挨拶申し上げます。

高等専門学校（高専）は、中学校卒業後5年の本科とさらに2年の専攻科から成る学校で、実践力と創造性のある高度技術者を養成することを目的としています。これまで、数校の高専が台湾の大学との間でそれぞれ教育・学術面の交流を行ってきましたが、このたび、国立高等専門学校機構の高専改革推進経費を得て、日本の高専4校と台湾の大学4校の学生が一堂に会し、日頃の研究や活動の成果に関し発表を行う、このシンポジウムを開催することになりました。

このシンポジウムのテーマである環境保全と福祉向上は、人々の生活から地球規模の問題までの幅広い分野にわたり、世界の平和とともに人類の重大な課題となっています。参加する8校の学生の多くが学ぶ理学や工学の教育研究分野においても、環境と福祉に関連する様々なテーマが取り組まれています。2日間にわたるシンポジウムは、そうした活動の一端を示すものとなるでしょう。また、これを契機に、この分野の教育研究がますます進展することを期待します。

このシンポジウムは英語を主要言語として行われます。日本と台湾を含む私たちのアジアは、民族や文化に豊かな多様性をもっており、お互いの意思疎通のために、欧米発祥の言語である英語が不可欠の手段になっています。これからの世代の人々は、こうしたグローバル社会に生きていく上で、英語を自然に使える力を身につけてほしいと思います。

日本では本年3月、東日本大震災が発生し、多くの尊い命が失われ、原子力発電所の事故と相まって、今も国民生活に様々な影響があります。この事態に際し、台湾を始め世界中の人々から暖かい支援や見舞いをいただき、困難な時に差し延べられる友情の大切さを痛感しました。日本は今、復興に向けて、国を挙げての懸命の努力をしています。

今回の被災地域である東北地方の中心的都市・仙台市は、中国文学の父とも言われる魯迅が20代の頃、留学生として医学を学んだ地です。日本語が不自由だった彼に授業ノートの添削を通じて熱心に指導し励ましてくれた解剖学の教師がおり、魯迅はこの教師を偉大な恩師として慕い、後に「藤野先生」という小説を著しました。

古来、中国や台湾と日本は一衣帯水を隔てるのみの近い間柄と言われ、人々の心は昔も今も、強い絆で結ばれています。このシンポジウムが、そのような絆を再確認するものとなり、また未来に向けて豊かな人材を育てる契機となることを望んでいます。

† Editor reproduced the Japanese preface by President Kudo here because it contains some special words which have no English translations, but are rigorously defined by the Japanese government.

Appendix D. Note for organization of the symposium (in Japanese)

名称：日台青少年シンポジウム
　　「環境保全と福祉向上のための研究成果発表と活動実践報告」２０１１
日時：平成２３年１２月１０日（土）～１１日（日）
場所：圓山大飯店（台北市）
主催：木更津工業高等専門学校、國立聯合大學
共催：沖縄工業高等専門学校、香川高等専門学校、舞鶴工業高等専門学校
　　國立高雄第一科技大學、正修科技大學、中州科技大學
後援：財団法人交流協会台北事務所
財源：高専改革推進経費「国際性の向上」（国立高等専門学校機構）
　　木更津工業高等専門学校　校費
　　國立聯合大學　校費
来賓：蕭萬長中華民国副総統、李世昌中華民国教育部国際文化教育事業処参事、
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運営組織：
　木更津工業高等専門学校
　　関口昌由　国際交流委員長
　　黄野銀介　国際交流委員
　　石出忠輝　国際交流委員
　　正木昭弘　事務部総務課総務係長
　國立聯合大學
　　林惠娟　研發長
　　王本壯　研究發展處企劃組組長
　　陳弘瑤　研究發展處行程規劃聯絡人
　　楊曉莉　研究發展處秘書
　　陳慧珍　研究發展處秘書
　　許璧如　副校長室秘書
　他多数