

第 23 回 環境化学討論会 要旨集 CD

23rd Symposium on Environmental Chemistry Abstracts CD

開催日時：2014 年 5 月 14 日～16 日

Dates: 14th — 16th May 2014

開催場所：京都大学百周年時計台記念館・芝蘭会館

Venue: Kyoto University, Kyoto, Japan



主催 日本環境化学会

Organised by Japan Society for Environmental Chemistry

May 14 (Wed.) Shiran-kaikan C (Yamauchi hall) 芝蘭会館 C 会場

International Session 1 生体影響 農薬・炭化水素・PPCPs

13:00	1C-01	Quantification of Neonicotinoids in Human Urine using Liquid Chromatography/ Tandem Mass Spectrometry	○Jemima Tiwaa Marfo 1, Yoshinori Ikenaka 1, Shouta Nakayama 1, Hazuki Mizukawa 1, Kumiko Taira 2, Kazutoshi Fujioka 3, Yoshiko Aoyama 4, Osei Akoto 5, Mayumi Ishizuka 1 (1; Hokkaido Univ., 2; Tokyo Women's Medical Univ., 3; Hawaii Institute of Molecular Education, 4; Aoyama Allergy Clinic, 5; Kwame Nkrumah Univ. of Sci. & Technol.)
13:20	1C-02	Methylated Polycyclic Aromatic Hydrocarbons and Their Contribution to AhR-mediated Activities in Street Dust from Vietnam and India	○Le Huu Tuyen 1,2, Nguyen Minh Tue 1,2, Shin Takahashi 4, Go Suzuki 3, Pham Hung Viet 2, Annamalai Subramanian 5, Kesav A.Bulbule 5, Shinsuke Tanabe 1 (1; CMES, Ehime Univ., 2; CETASD, Hanoi Univ. of Sci., 3; NIES, Japan, 4; Faculty of Agricultural Faculty, Ehime University, 5; KLE's Nijalingappa College, Bangalore, India)
13:40	1C-03	Occurrence of Micro-pollutants in Wastewater Effluents from Biogas Digester - Health Risk Assessment	○Le Thi Phuong Hong 1, Duong Thi Hanh 1, Chau Thi Cam Hong 2, Pham Duc Phuc 1, Nguyen Viet Hung 3, Kiwao Kadokami 2, Yoshiharu Shirane 4 (1; Hanoi School of Public Health, Vietnam, 2; University of Kitakyushu, Japan, 3; Swiss Tropical and Public Health Institute, Switzerland, 4; ShiranACE Ltd, Japan)
14:00	1C-04	Cancelled	
14:20	1C-05	Removal and Occurrence of Pharmaceuticals in Sludge and Wastewater from a Wastewater Treatment Plant in Korea	○Il-hoe Kim 1, Sang-jung Lee 2, Norihide Nakada 2, Hiroaki Tanaka 2, Ihn-sup Han 1 (1; Univ. of Seoul, 2; RCEQM, Kyoto Univ.)

International Session 2 生態系・環境レベル

15:00	1C-06	Residue Levels and Health Risk Assessment of Organochlorine Pesticides (OCPs) in Domesticated Animals from Egypt	○Abdallah Fikry A. Mahmoud 1,2, Elsaid A. Eldaly 2, Alaa Eldin M.A. Morshdy 2, Yoshinori Ikenaka 1, Shouta Nakayama 1, Hazuki Mizukawa 1, Yared B. Yohannes 1, Waleed R. El-Ghareeb 2, Mohamed Tharwat El-Abbasy 2, Mayumi Ishizuka 1 (1; Hokkaido Univ., 2; Zagazig Univ.)
15:20	1C-07	Polybrominated Diphenyl Ethers (PBDEs): Occurrence and Debromination in Tropical Asian Countries	○Charita S. Kwan 1, Hideshige Takada 2, Kaoruko Mizukawa 2, Mahua Saha 2, Rinawati 3, Rei Yamashita 2, Ruchaya Boonyatumanond 4, Evangeline C. Santiago 1 (1; Natural Sci. Research Institute, Univ. of the Philippines, 2; Laboratory of Organic Geochemistry, Tokyo Univ. of Agri. & Technol., 3; Faculty of Math. & Natural Sci., Univ. of Lampung, Indonesia, 4; Env. Research and Training Center, Thailand)
15:40	1C-08	Australasia Pellet Watch: POPs Monitoring in Australia and New Zealand Using Plastic Resin Pellets with International Pellet Watch as a Tool for Effective Risk Communication	○Bee Geok Yeo 1, Hideshige Takada 1, Heidi Taylor 2, Maki Ito 1, Junki Hosoda 1, Wally Smith 2, Mayumi Allinson 3, Sharnie Connell 3, Laura Greaves, Mark Browne, Taj Powell, John McGrath 4 (1; Tokyo Univ. of Agri. & Technol., 2; Tangaroa Blue Foundation, 3; CAPIM, Univ. of Melbourne, 4; Surfriider Foundation Australia)
16:00	1C-09	The Ccapacity Building for Analysis and Reduction Measures of Persistent Organic Pollutants in Serbia	○Takeshi Nakano 1, Vladimir Beškoski 2 (1; Osaka Univ., 2; Belgrade Univ.)
16:20	1C-10	Potential Environmental Application of Microbial Polysaccharides	○Marijana Marković 1, Branka Kekez 2, Dragica Jakovljević 1, Gordana Gojgić-Cvijović 1, Dragan Manojlović 2, Vladimir Beškoski 2, Miroslav Vrvic 2 (1; Institute of Chemistry, Technol. & Metallurgy, Univ. of Belgrade, Serbia, 2; Faculty of Chemistry, Univ. of Belgrade, Serbia)

International Session 3 重金属汚染・PAH・ダイオキシン・環境レベル

10:15	3C-01	Present Status of Trace Elements Contamination in River and Marine Sediments and Fish from Jakarta Bay, Indonesia	○Adi Slamet Riyadi 1,2, Takaaki Itai 1, Tomohiko Isobe 1, Agus Sudaryanto 2, Muhammad Ilyas 2, Iwan Eka Setiawan 2, Shinsuke Tanabe 1 (1: CMES, Ehime Univ., 2: BPPT, Indonesia)
10:35	3C-02	A First Order Estimate of Total Metal(loid)s in Soil of e-Waste Recycling Site in Accral, Ghana	○Takaaki Itai 1, Asante Ansong Kwadwo 2, Akitoshi Goto 1, Samuel Obiri 2, Shin Takahashi 1,3, Shinsuke Tanabe 1 (1: CMES, Ehime Univ., 2: CSIR Water Research Institute, Ghana, 3: Dept. Agri., Ehime Univ.)
10:55	3C-03	Lead Pollution in the Children in Kabwe Mining Area, Republic of Zambia	○Shouta Nakayama 1, John Yabe 2, Yoshinori Ikenaka 1, Yared Beyene Yohannes 1, Balazs Oroszlany 1, Nesta Bortey-Sam 1, Kaampwe Muzandu 2, Kennedy Choongo 2, Abel Kabalo 3, John Ntapisha 3, Aaron Mweene 2, Takashi Umemura 1, Mayumi Ishizuka 1 (1: Hokkaido Univ., 2: Univ. of Zambia, 3: Kabwe District Health Office)
11:15	3C-04	Leaching of Arsenic from Tailings by Microbially Produced Rhamnolipids	○Vladimir P. Beškoski 1,2, Ivana Perić 2, Gordana Gojđić-Cvijović 2, Latinka Slavković Beškoski 3, Biljana Dojčinović 2, Miroslav M. Vrvic 1,2 (1: Faculty of Chemistry, Univ. of Belgrade, Serbia, 2: Institute of Chemistry, Technol. & Metallurgy, Univ. of Belgrade, Serbia, 3: Institute of Nuclear Sci. Vinca, Univ. of Belgrade, Serbia)
11:35	3C-05	Health Risk Assessment of Atmospheric Polycyclic Aromatic Hydrocarbons in Kumasi-Ghana	○Nesta Bortey-Sam 1, Yoshinori Ikenaka 1, Shouta Nakayama 1, Osei Akoto 2, Yared Beyene Yohannes 1, Hazuki Mizukawa 1, Mayumi Ishizuka 1 (1: Hokkaido Univ., 2: Kwame Nkrumah Univ. of Sci. & Technol., Ghana)
11:55	3C-06	Effect of Flocculating Agent on the Formation of Polychlorinated Dibenzodioxin and Dibenzofurans in Sewage Sludge Incineration	○Xiaoqing Lin, Xiaodong Li, Shengyong Lu, Fei Wang, Tong Chen, Jianhua Yan (Zhejiang Univ., China)

International Session 4 ダイオキシン・POPs・リン系塩素系難燃剤

13:45	3C-07	Dioxin in Vietnam	○Le Thi Hai Le, Nguyen Xuan Net, Le Ke Son (Office of National Steering Committee 33, MONRE, Vietnam)
14:05	3C-08	Concentrations of Phosphorous Flame Retardants (PFRs) in Atmosphere, Bulk Deposition, and Soil in Kyoto, Japan	○Nguyen Thanh Dien 1, Yasuhiro Hirai 1, Toru Miyazaki 2, Shin-ichi Sakai 1 (1: Kyoto Univ., 2: Nippon Steel & Sumikin Technology)
14:25	3C-09	Evaluation of New & Legacy POPs Monitoring Techniques in Ambient Air and Results from Frequent Monitoring at Supersite, Japan	○Takumi Takasuga 1, Takeshi Nakano 2, Yasuyuki Shibata 3 (1: Shimadzu Techno-Research Inc., 2: Osaka Univ., 3: NIES)
14:45	3C-10	Determination of Atmospheric Dechlorane Plus in North-East Asia and Dietary Exposure Level in Japan	○Kensaku Kakimoto 1,3, Kazuhiko Akutsu 1, Toshiki Tojo 2, Takanori Sakiyama 2, Yoshimasa Konishi 1, Keiji Kajimura 1, Kazuichi Hayakawa 3, Akira Toriba 3 (1: Osaka Prefectural Institute of Public Health, 2: Osaka City Institute of Public Health and Env. Sci., 3: Kanazawa Univ.)
15:05	3C-11	Oil Pollution Analysis Using Comprehensive GC-MS (GCxGC-MS)	○Haruhiko Miyagawa 1, Riki Kitano 1, Katsuhiro Nakagawa 1, Megumi Hirooka 1, Shunji Hashimoto 2, Vladimir P. Beškoski 3, Narayanan Kannan 4, Takeshi Nakano 5 (1: Shimadzu corporation, 2: NIES, 3: Faculty of Chemistry, Univ. of Belgrade, 4: Univ. Putra Malaysia, 5: Osaka Univ.)

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1C-10

Potential environmental application of microbial polysaccharides

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[Introduction]

Biopolymers are much more environment friendly. Microbial exopolysaccharides (EPSs) have been commercially used in various industrial and medical sectors for many years. These biomaterials in their natural or modified form have excellent physical and chemical properties, based on their capacity to alter the basic properties of water (eg. thickening or gelling). Our attention has been drawn to levan and pullulan as they are non-toxic, non-mutagenic and odorless substances. These biopolymers are reported as antitumor, prebiotic, immunonutrient [1] and for encapsulation agents; also applied as stabilizer, adhesive, emulsifier, flavor and fragrance carrier. This work focuses on their application in the field of ecotoxicology. Here we report toxicity inhibition effect of EPSs on copper (II) in acute toxicity tests with *Artemia salina* and *Daphnia magna*.

[Methods]

Levan was produced by *Bacillus sp.* NS032 [2]. Pullulan was produced by *Aureobasidium pullulans* strain CH-1 (IChTM, Collection of Microorganisms). Inulin was used as commercial available product. Acute toxicity tests were performed according to standardised guidelines OECD 202 (2004) [3] and Persoone & Wells (1987) [4]. In all tests copper (II) was used as CuSO₄·x5H₂O or CuCl₂·x2H₂O. Endpoint was the mortality of neonata or nauplii. Toxic effect for each sample was expressed as the percentage of mortality. Tests were considered valid if the mortality in the control did not exceed 10 %. The LC₅₀ (EC₅₀) values were estimated by regression models: Probit and Spearman–Karber using TesTox software [5].

[Results and discussion]

Levan's potential to decrease toxic effect of different substances “*in vivo*” has great bioremediation and agricultural application [6]. Screening test for applicable levan concentration on copper toxicity inhibition was performed by *Artemia salina*. Survival in the negative control was consistently >90%, and reference toxicant tests were within the range of acceptable values. Mortality decreased as amount of levan increased (Figure 1). Mortality percentage after 48 h had been reduced up to 50 % in comparison to mortality induced by copper solution without levan.

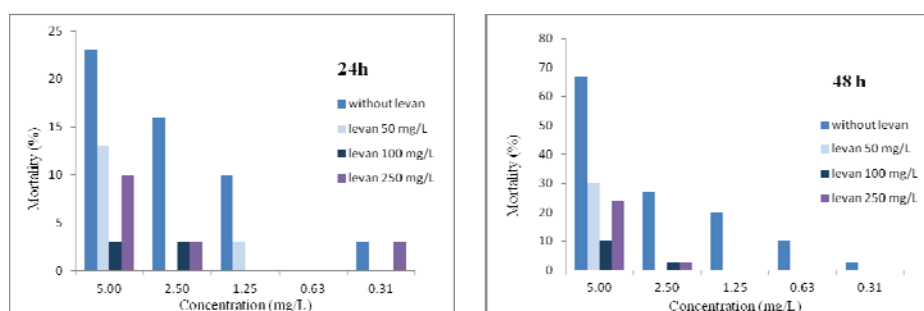


Figure 1. Decrease of *Artemia salina* mortality (%) due to application of 50, 100 and 250 mg/L levan concentration in the 24/48 h period

Levan concentration of 50 mg/L was considered more cost effective than 100 mg/L and was used to test its biocompatibility for inhibition of copper in further studies. The chosen concentrations of copper salts were higher than in screening test. To understand better these results, two other polysaccharides were included, and *Daphnia magna* as a standard test model. The results of 24 and 48 h LC₅₀ are presented in Table 1.

Table 1. The results of *Daphnia magna* and *Artemia salina* acute toxicity tests: 24 and 48 h LC₅₀ values with 95% confidence intervals (in brackets); ND – not detected.

Copper / EPSs	<i>Daphnia magna</i>		<i>Artemia salina</i>	
	LC ₅₀ (mg/L)			
	24h	48h	24h	48h
Cu ²⁺	0.20 (0.16-0.24)	0.14 (0.11-0.18)	1.67 (0.99 - 2.29)	1.30 (0.32 - 1.96)
Cu ²⁺ /levan	0.54 (0.18 -2.34)	0.44 (0.23 -0.85)	1.34 (0.20-2.84)	1.16 (-)
Cu ²⁺ /pullulan	0.73 (0.61 - 0.88)	0.45 (0.36 -0.56)	7.06 (5.71-8.47)	0.24 (0.02-0.75)
Cu ²⁺ /inulin	0.39 (0.30 - 0.50)	0.13 (0.075 - 0.17)	1.47 (0.44-2.70)	ND

Applied PSs (levan, pullulan and inulin) at higher copper concentrations in the test with *Daphnia magna* had more efficiently reduced the toxic effect in comparison to *Artemia salina* based on LC₅₀ values (Table 1). Levan and pullulan achieved similar LC₅₀ values, though they vary in structure. Such a result could be consequence of their conformational flexibility which they form in aqueous solution. Inulin is in the same structural group as levan (fructans). Both fructan polymers can be either right or left - handed twist, although most levan were found to be left – handed, and pullulan backbone adopts a random coil conformation in aqueous solutions [8].

[Conclusion]

This work focuses on the microbial polysaccharides application in the ecotoxicology, field which makes these biopolymers promising materials and means in the future. In screening test (*A. salina* bioassay) mortality percentage after 48 h has been reduced up to 50 %, nevertheless chosen concentration of EPSs was not adequate when higher concentration of copper was applied. In *Daphnia magna* bioassay, EPSs had efficiently reduced the toxic effect, but further studies are necessary to determine EPSs biocompatibility and pollution ratio.

[References]

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