

8th International Symposium on Feedstock Recycling of Polymeric Materials

(8th ISFR 2015) 報告

東北大学 熊谷将吾

2015年9月7日～9月10日の4日間、オーストリア南東部に位置するレオベンの Montanuniversität Leoben (モンタン大学)にて、“8th International Symposium on Feedstock Recycling of Polymeric Materials (8th ISFR2015)”が開催されました。今回は、Plastic Recycling、Biomass Conversion、Recycling Concepts、Chemical Recycling、Composites Recycling、Pyrolysis、および Catalytic Conversion のセッションからなる口頭発表、およびポスター発表が行われ、計 15 ヶ国から基調講演 10 件、口頭発表 38 件、およびポスター発表 19 件の計 67 件の研究が報告されました。プラスチックおよびバイオマスの有効利用技術、リサイクルコンセプト、環境影響評価等、関連する幅広い分野の参加者が募ったため、専門分野の枠を超えた活発な議論が交わされていました。当プラスチックリサイクル化学研究会からも、加茂会長を始め多くの方が参加しました。

Gala dinner では、学生発表者 4 名に対し ISFR 2015 AWARD が贈られ、日本からは東北大学の平橋氏が受賞しました。受賞者は以下の通りです。

Aitziber Adrados (University of the Basque Country UPV/EHU)

Amal Al-Rahbi (University of Leeds)

Suguru Hirahashi (Tohoku University)

Joseba Andoni Salbidegoitia (University of the Basque Country UPV/EHU)

最終日にはテクニカルツアーとして、バイオマス発電プラントのある Güssing およびペットボトルリサイクルプラントである PET to PET Austria を見学しました。見学時間を超過する程の多くの質問が参加者から集まり、大盛況となりました。

本国際会議が大成功に終わりましたのは、Chairman であるモンタン大学の Markus Lehner 教授や、Markus Bauer 氏を始めとする関係者皆様のご尽力の成果であり、心より御礼申し上げます。



会場のモンタン大学



口頭発表会場

The Program of 8th International Symposium on Feedstock Recycling of Polymeric Materials

Monday September 7th, 2015

8:00 onwards	Registration (Symposium desk open)
9:00 - 9:30	Welcome address Mayor of the city of Leoben Kurt Wallner Dr. <i>Tohru Kamo</i> , FSRJ
9:30 - 10:10	Keynote Lecture 1 (Chairman: M. Lehner) Thermochemical Conversion of Biomass - New Trends <i>M. Stöcker</i>
10:10 - 10:40	Coffee Break
10:40 - 12:00	Session 1: Biomass Conversion I (20 min for each presentation) Chairman: M. Lehner
CT01	Production of phenol and acetic acid from palm residues with activated carbon using fast pyrolysis in a bench-scale plant equipped with fluidized bed reactor <i>Soo-Hwa Jeong, Jae-Yong Jeong, Uen-Do Lee</i>
CT03	Comparison of the biomass waste pyrolysis process in continuous screw and semibatch reactors <i>A. Adrados, J. Solar, I. de Marco, B. Caballero, A. Lopez-Urionabarrenechea</i>
CT04	Thermal decomposition of black locust and wheat straw under torrefaction <i>E. Barta-Rajnai, Z. Sebestyén, J. Bozi, E. Jakab, Zs. Czégény</i>
CT05	Drying mechanism of unutilized cedar logs as a source of heating fuel <i>V.H. Hoang, Y. Kawabata, M. Adachi, T. Wajima, H. Nakagome</i>
12:00 - 12:40	Keynote Lecture 2 (Chairman: M. Lehner) Production of Synthesis Gas from Thermal Co-Gasification of Biomass and Plastics <i>H. Hofbauer</i>
12:40 - 14:00	Lunch Break
14:00 - 15:00	Session 2: Biomass Conversion II (20 min for each presentation) Chairman: M. Stöcker
CT06	Catalytic steam reforming of volatiles from pyrolysis of biomass and HDPE mixtures <i>A. Arregi, G. Lopez, M. Amutio, M. Artetxe, J. Alvarez, I. Barbarias, M. Olazar</i>
CT07	Catalytic steam reforming of biomass tar model compounds over Ni/Al ₂ O ₃ catalyst <i>M.A. Nahil, M. Artetxe, C. Wu, P.T. Williams</i>
CT08	Tar reduction from biomass gasification using waste derived pyrolysis chars <i>A.S. Al-Rahbi, J.A. Onwudili, P.T. Williams</i>
15:00 - 15:40	Keynote Lecture 3 (Chairman: M. Stöcker) (※cancelled) Thermocatalytic process for the valorization of natural polymeric materials <i>T. Bhaskar</i>



Welcome address:

(左) Kurt Wallner レオベン市長

(右) 加茂徹 FSRJ 会長

Chairman: Prof. M. Lehner 氏

 15:40 - 16:30 Coffee Break

 16:30 - 18:00 **Session 3: Poster Session** Chairman: T. Bhaskar

Flash Presentations of 19 posters 2 min each.

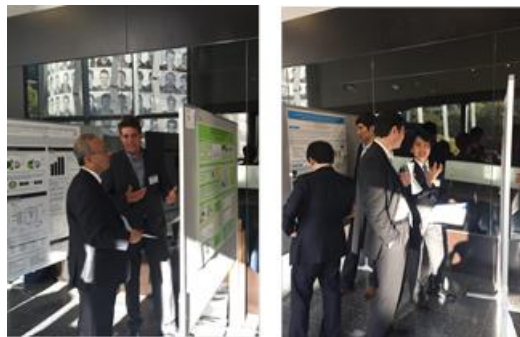
Poster program

P1	FLEXI-PYROCAT: A EU MARIE SKŁODOWSKA-CURIE ACTION PROJECT ON THE FLEXIBLE PYROLYSIS-CATALYSIS PROCESSING OF WASTE PLASTICS FOR SELECTIVE PRODUCTION OF HIGH VALUE PRODUCTS <i>P. T. Williams, M. Wang, N. Miskolczi, Y. Zhang, H. Chen, J. Huang</i>
P2	ELECTRICAL PROPERTIES OF ALUMINIUM SPUTTERED THIN FILMS ON POLYMERS AND GLASS <i>B.Nagl, T.Schulte, K. H. Gresslehner, Gerald Zauner, Daniel Heim, Wolfgang Stadlbauer</i>
P3	BIODEGRADABILITY STUDY OF NATURAL TEXTILE MATERIALS <i>B. Vončina, K. Arshad, M. Skrifvars, V. Vivod, J. Volmajer Valh</i>
P4	BLENDED FILAMENT YARNS MADE OF MIXED POLYMER PRODUCTS <i>T. Schlüter, G. Seide, T. Gries</i>
P5	CHEMICAL RECYCLING OF PET YARN <i>B. Vončina, J. Volmajer Valh, E. Šimon, S. Vajnhandl, A. Lobnik</i>
P6	PRODUCTION OF HYDROGEN BY PYROLYSIS-CATALYTIC STEAM REFORMING OF PLASTICS <i>I. Barbarias, G. López, M. Amutio, M. Artetxe, J. Alvarez, A. Arregi, M. Olazar</i>
P7	PROCESS DEVELOPMENT FOR RECYCLING OF PAN BASED PRODUCTION WASTE, REPAN <i>S. Schriever, R. Rensmann, G. Seide, T. Gries</i>
P8	DEVELOPMENT OF METAL RECOVERY TECHNIQUE FROM INTEGRATED CIRCUIT USING GASIFICATION WITH NaOH <i>K.Baba, S.Katano, T.Wajima, H.Nakagome</i>
P9	ADAPTABILITY OF WOOD PELLET TO FIXED BED GASIFIER <i>H. Yasuda, Y. Suzuki, S. Sakai, T. Wajima, H. Nakagome</i>
P10	LIQUID FUEL FROM PB HYDROCRACKING <i>J. A. Salbidegoitia, E. G. Fuentes, M. P. González-Marcos, J. R. González-Velasco</i>
P11	PRELIMINARY STUDIES ON CATALYTIC ABS HYDROCRACKING <i>J. A. Salbidegoitia, E. G. Fuentes, M. P. González-Marcos, J. R. González-Velasco</i>
P12	AIR GASIFICATION OF DRIED SEWAGE SLUDGE IN A TWO STAGE GASIFIER USING NI/ACTIVATED CARBON CATALYST FOR THE PRODUCTION OF A TAR-FREE PRODUCER GAS <i>Y.-K. Choi, J.-S. Kim</i>
P14	PRODUCT OIL FROM WASTE PLASTIC CONSUMER ELECTRONICS USING DEVELOPED CATALYST <i>K.Nosho, H.Tsutsumi, H.Hirate, H.Tani, M.Yukumoto</i>
P15	DESIGN AND DEVELOPMENT OF VERTICAL PRECIPITATION SEPARATOR OF WASTE PLASTICS <i>H.Hirate, K.Nosho, Y.Hibino, M.Yukumoto</i>
P16	CATALYTIC CRACKING OF NITROGEN CONTAINING PLASTICS USING SPENT FCC CATALYST <i>K. Gyotoku, H. Tani, Y. Murakami, K. Fujimoto, K. Asami, Y. Muranaka, S. Noda</i>
P17	PYROLYSIS OF RUBBER TUBES FROM CAR ENGINE COMPARTMENTS <i>J. Bozi, G. Bakos, Zs. Czégény, E. Jakab, M. Blazsó</i>
P18	CATALYTIC PYROLYSIS OF MIXTURES MODELING MUNICIPAL WASTE – STATISTICAL EVALUATION OF THE PYROLYSIS DATA <i>Z. Sebestyén, E. Barta-Rajnai, J. Bozi, M. Blazsó, E. Jakab, N. Miskolczi, Zs. Czégény</i>
P19	CAPTURE OF HYDROGEN CHLORIDE RELEASED BY THERMAL DEGRADATION OF PVC <i>J. Korpas, K. Wichterle</i>

P24	THERMAL AND CATALYTIC DECOMPOSITION STUDIES OF MICROALGAL RESIDUE USING PYROLYSIS-GC/MS AND TG/MS <i>Z. Sebestyén, E. Barta-Rajnai, J. Bozi, B. Bhavya, T. Bhaskar, Z. May, Zs. Czégény, E. Jakab</i>
18:00- 19:30	Welcome Reception Continuing Poster Discussions accompanied by Styrian Regional Products
Tuesday September 8th, 2015	
8:00 onwards	Registration (Symposium desk open)
9:00 - 9:40	Keynote Lecture 4 (Chairman: M. Goto) Averting landfill of plastic waste - case study on central area in Tokyo <i>H. Ida</i>
09:40 - 11:00	Session 4: Plastic Recycling I (20 min for each presentation) Chairman: M. Goto
CT10	Recycling of PVC pipes and fittings in Japan: proactive approach of industry to and its impacts on legal/technical frameworks <i>S. Seki, T. Yoshioka</i>
CT11	In-depth analysis of plastic flows and stocks in Austria <i>E. Van Eygen, J. Feketisch, D. Laner, J. Fellner</i>
CT12	Evaluation of mechanical recyclability of technical biopolymers <i>A. Klein, E. Blees, M. Feuchter, K. Resch</i>
CT13	Mechanical preparation of post-consumer plastics for feedstock recycling <i>M. Bauer, M. Lehner, W. Hofer</i>
11:00 - 11:30	Coffee Break
11:30 - 12:30	Session 5: Plastic Recycling II (20 min for each presentation) Chairman: T. Yoshioka
CT14	Near infrared hyperspectral imagery for waste recycling and real-time quantitative inline analysis of raw materials <i>M. Kerschhaggl</i>
CT15	Chemical modification of chlorinated poly(vinyl chloride) by nucleophilic substitution <i>S. Endo, Y. Nagasaki, G. Grause, T. Kameda, T. Yoshioka</i>
CT16	Interaction of plasticizer and poly(vinyl chloride) degradation in the presence of steam <i>G. Grause, J. D. Fonseca, T. Kameda, T. Yoshioka</i>
12:30 - 13:30	Lunch Break
13:30 - 14:10	Keynote Lecture 5 (Chairman: T. Yoshioka) Latest technology and social system for recovery of useful resources from end-of-life industrial products in Japan <i>T. Kamo</i>



口頭発表の様子



ポスター発表の様子

14:10 - 15:30	Session 6: Recycling Concepts (20 min for each presentation) Chairman: R. Pomberger
CT17	Material recovery from PV modules <i>K. Wambach, W. Rommel</i>
CT18	Recovery of useful resources from photovoltaic module by using liquefaction of cured ethylene vinyl acetate (EVA) <i>T. Kamo, H. Ito</i>
CT19	Development of recycling concepts for textile coverings <i>A. Schröter, U. Rübsam, T. Schlüter, Y.-S. Gloy, T. Gries</i>
CT20	Pyrolysis of waste electrical and electronic equipment (WEEE) for recovering metals and energy – previous achievements and current approaches <i>P. Hense, K. Reh, M. Franke, A. Hornung</i>
15:30 - 16:00	Coffee Break
16:00 - 17:20	Session 7: Chemical Recycling (20 min for each presentation) Chairman: J. Escola
CT21	An efficient conversion of polyamides to chemical feedstock <i>A. Kamimura, H. Matsumoto, K. Ikeda, K. Kaiso</i>
CT22	Influences of impurities on thermal cracking of polyolefin-rich post-consumer plastics <i>T. Schubert, M. Lehner</i>
CT23	Influence of polystyrene on the thermal degradation of polyolefins dissolved in a high boiling solvent at moderate temperatures <i>D. Kowald, M. Lehner</i>
CT24	Recycling of poly(lactic acid) into construction materials of elevated roads <i>N. Nishida</i>
17:20 - 18:00	Keynote Lecture 6 (Chairman: J. Escola) Waste Derived Fuels <i>R. Pomberger</i>
18:30	Brewery Tour (Meeting point: Symposium desk)
Wednesday September 9th, 2015	
8:00 onwards	Registration (Symposium desk open)
9:00 - 9:40	Keynote Lecture 7 (Chairman: T. Kamo) Carbon Fibre Plastics Recycling <i>A. Herrmann</i>

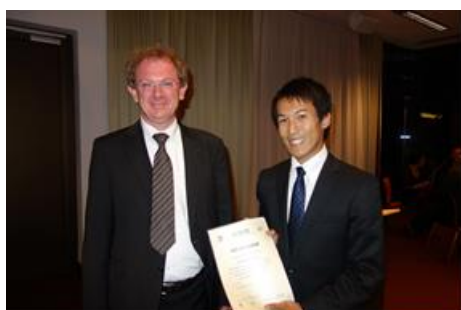


Brewery tourの様子



Gala dinnerの様子

9:40 - 11:00	Session 8: Composites Recycling (20 min for each presentation) Chairman: T. Kamo
CT25	Recycling of fiber reinforced polymer composites from wind energy plants <i>E. Seiler, F. Henning, U. Teipel</i>
CT26	CFRP Recycling - a view on complete process chains <i>S. Kreibe, W. Rommel</i>
CT27	Development of a recycling method for composite materials consisting of poly(ethylene terephthalate) and poly(vinyl chloride) <i>S. Hirahashi, G. Grause, S. Kumagai, T. Kameda, T. Yoshioka</i>
CT28	Subcritical fluid technology for recycling fiber reinforced plastics <i>M. Goto, T. Nakagawa</i>
11:00 - 11:30	Coffee Break
11:30 - 12:10	Keynote Lecture 8 (Chairman: K. Wambach) Recycling Technologies for rare earths <i>H. Antrekowitsch, S. Luidold</i>
12:10 - 12:50	Session 9: Pyrolysis I (20 min for each presentation) Chairman: K. Wambach
CT29	Thermal decomposition of tetrabromobisphenol-A containing printed circuit boards in the presence of calcium hydroxide <i>S. Kumagai, G. Grause, T. Kameda, T. Yoshioka</i>
CT31	Production of oil and char with low sulfur contents from scrap tires by a newly developed two stage pyrolysis process <i>G.-G. Choi, J.-S. Kim</i>
12:50 - 14:00	Lunch Break
14:00 - 14:40	Keynote Lecture 9 (Chairman: A. Buekens) Plastic Recycling as Valuable Feedstock for Refining Industries <i>W. Hofer</i>
14:40 - 15:40	Session 10: Pyrolysis II (20 min for each presentation) Chairman: A. Buekens
CT32	Carbon nanotubes (CNTS): a value-added by-product from the production of hydrogen via the pyrolysis-catalytic gasification of waste tires <i>Y. Zhang, C. Wu, M. A. Nahil, P. T. Williams</i>
CT33	Extensive research in producing carbon nanotubes (CNTS) and hydrogen from catalytic thermo-chemical conversion of waste plastics <i>C. Wu, M. A. Nahil, J. C. Acomb, Y. Zhang, M. Norbert, J. Huang, P. T. Williams</i>
CT34	Experimental and mechanism study on the pyrolysis of carbon black filled irradiation cross-linked polyethylene <i>Y. Du, X. Jiang, Y. Jiang, G. Lv, Y. Jin, F. Wang, Y. Chi, J. Yan, A. Buekens</i>



授賞式(東北大：平橋氏)



加茂会長から Lehner 教授へプレゼント

15:40 - 16:10	Coffee Break
16:10 - 16:50	Keynote Lecture 10 (P. T. Williams) Catalyst design for the production of fuels and/or chemicals from waste plastics <i>D. Serrano</i>
16:50 - 17:50	Session 11: Catalytic Conversion (20 min for each presentation) P. T. Williams
CT35	Effect of preparation on Pt/Hb catalysts for PS hydrocracking <i>J. A. Salbidegoitia, E. G. Fuentes, M. P. González-Marcos, J. R. González-Velasco</i>
CT36	Dry reforming of waste plastics for syngas production <i>J. M. Saad, M. A. Nahil, C. Wu, P. T. Williams</i>
CT38	Increasing the liquid share in the hydroreforming of a model mixture of LDPE thermal cracking oil by varying the Si/Al atomic ratio of Ni/h-beta catalysts <i>J. M. Escola, L. Briones, A. Cordero, D. P. Serrano</i>
19:30	Gala Dinner

Thursday September 10th, 2015

Technical Tour	
8:00	Start at Leoben by Bus
10:00	Model Guessing „a strategy of de-centralised, local energy production with all available renewable resources in a region“ Biomass power plant Guessing - Fluidised steam gasification Methanation – SNG from biomass, Biogas facility, Biomass Long Distance Heating Plant Guessing
12:00 - 13:00	Lunch break at Guessing (costs are not included - payment only in cash available)
15:00	PET to PET Recycling Austria „the bottle to bottle concept“, PET cleaning, PET sorting and separation
17:00	Arrival at Vienna airport, alternatively return to Leoben by bus



Technical Tour (Güssing) の様子



Technical Tour (PET to PET Austria) の様子