AAT SummerSchool のお知らせ

アジア熱電連盟（AAT）が主催するAAT SummerSchoolが8月27日の1時から京都大学（IUMRS-ICAM2017の会場）で下記の英文紹介のように開催される予定です。
参加費は無料ですので、どうぞ奮ってご参加ください。pmele@mmm.muroran-it.ac.jpまで、メールでご参加申し込みください。若手優先ですが、場所がございます限り、シニアな方も歓迎です。

日程：2017年8月27日　13時～17時半
場所：京都大学吉田キャンパス　国際高等教育院棟(ILAS)　3階　31号室
http://www.z.k.kyoto-u.ac.jp/facility-guide/ilas-bldg

Announcement and schedule of 2nd AAT Summer School

The materials science and engineering of thermoelectricity play key roles in realizing high-efficiency direct heat-to-electricity conversion.
Following the success of first edition of 2016 in Wuhan (in the framework of ICT2016) this second edition of thermoelectric summer school will be organized by the Asian Association of Thermoelectrics (AAT) as a pre-conference event of Symposium A5 at IUMRS-ICAM 2017 in Kyoto.
The aim of the school is to provide both beginners and younger researchers with a short course on basic science and technologies of thermoelectricity. This tutorial will broadly cover theories on electrical/thermal transports, new phenomena/concepts, and also address designing devices and systems for practical applications.
All students, younger researchers, and beginners under the auspice of AAT are encouraged to apply for the slots allotted to each thermoelectric body society in China, Japan, and Korea (20 slots each). The extra slots (about 20) will be booked on a “first-come, first-served” basis.

Time: August 27, 2017, 13:00-17:30

Location: Kyoto University, Yoshida Campus, Institute of Liberal Arts and Sciences (ILAS) building, 3rd floor, room 31
http://www.z.k.kyoto-u.ac.jp/facility-guide/ilas-bldg

Registration fee: Free for students and researchers from universities and public

organizations

Total capacity: around 80 slots

Application: send e-mail to Paolo Mele (Muroran IT, Japan, pmele@mmm.muroran-it.ac.jp) or one of the organizers

Organizers: Lidong Chen (Shanghai Institute of Ceramics, CAS, China, cld@mail.sic.ac.cn) ; Takao Mori (National Institute for Materials Science, Japan, MORI.Takao@nims.go.jp) ; Wonseon Seo (Korea Institute of Ceramic Engineering Technology, Korea, wsseo@kicet.re.kr)

Topics:
13:00–14:05
Theoretical Considerations for Enhancing Thermoelectric Properties
Yukari Katsura (Univ. Tokyo, Japan)

14:05–15:10
Thermoelectric properties of bulk composites
Jong-Soo Rhyee (Kyung Hee University, South Korea)

10 minutes break

15:20–16:25
Processing of Advanced Thermoelectric Materials
Jing-Feng Li (Tsinghua University, China)

16:25–17:30
Applicative Issues for Thermoelectrics
Woosuck Shin (AIST, Japan)

Theoretical considerations for enhancing thermoelectric properties

Yukari Katsura
Department of Advanced Materials Science, Graduate School of Frontiers Sciences,
The University of Tokyo

Thermoelectric properties are deeply related to the electronic structures, so that first-principles calculations are considered to be the powerful tools to predict thermoelectric properties as functions of carrier concentrations. In this lecture, we will overview the basic concepts of reciprocal lattices and first-principles calculations, with full of visual explanations. Then, we will compare the electronic structures of the major thermoelectric materials, to get the hints for the characteristic electronic structures for good thermoelectric propeties. Finally, we observe the effects of the changes in electronic structures on the predicted thermoelectric properties, to discuss the major sources of errors in the predictions, due to the errors in crystal structures, electronic structures and Boltzmann transport calculations.

Biography

Yukari Katsura is an Assistant Professor in Kaoru Kimura Laboratory, Department of Advanced Materials Science, Graduate School of Frontiers Sciences, the University of Tokyo. She also serves as a Special Researcher in the Center for Materials Research by Information Integration, National Institute of Materials Science, Japan. She graduated from the Department of Applied Chemistry, School of Engineering, the University of Tokyo in 2004 and obtained her PhD from the same department in 2009. She worked as a Special Postdoctorial Researcher in RIKEN (Saitama, Japan) (2009-2012), Special Researcher in the department of Physics (2012-2014) and in the department of Applied Physics (2014-2015) in the University of Tokyo. She has also worked as a Part-time Lecturer in Shibaura Institute of Technology (Saitama, Japan) from 2015 to 2017. The research themes shifted from the microstructural control of bulk superconductors, to the experimental and theoretical searches for new superconductors and thermoelectric materials. Currently, she is working on materials informatics on thermoelectric materials using experimental data. She has received the Yukari Katsura, Award for Encouragement of Research in Materials Science, International Union of Materials Research Societies – International Conference on Electronic Materials (IUMRS-ICEM2012), and The 2014 ITS Outstanding Poster Award at the 33rd International Conference on Thermoelectrics.

Thermoelectric properties of bulk composites

Jong-Soo Rhyee
Department of Applied Physics
Kyung Hee University, Korea

Because of the raised awareness on the global energy and environmental crisis, it has been focused on the renewable energy and waste heat recovery technologies. Thermoelectric energy harvesting is the solid state energy conversion technology from waste heat into electricity and vice versa. The energy conversion efficiency is determined by the dimensionless figure-of-merit, defined by $ZT = S^2\sigma T/\kappa$ where S, σ, T, and κ are the Seebeck coefficient, electrical conductivity, absolute temperature, and thermal conductivity, respectively. Here, we overview the recent investigations on thermoelectricity in terms of nano-structural approach and new materials design. In most cases, nano-structural bulk composites are aiming to decrease lattice thermal conductivity from grain boundary phonon scattering of phonons. By combining band convergence and nano precipitation, thermoelectric performance can be maximized by increasing the power factor and lowering lattice thermal conductivity. In some part, we introduce a new concept of topological bulk composite which indicates a bulk composite between thermoelectric and topological materials.

Biography

Jong-Soo Rhyee is an associate professor in the Department of Applied Physics, Kyung Hee University and an Advisory scientist of LG Electronics. He graduated Dept. of Physics from Chungbuk National University (1998, BS) and Pohang University of Science and Technology (POSTECH) (2000, MS). He got Ph.D from the Dept. of Materials Science and Engineering, Gwangju Instititute Science and Technology (GIST), Korea in 2005. After working in Max-Plank-Institute at Stuttgart as a post-doctoral researcher during 2006-2007, he moved to Samsung Advanced Institute of Technology (SAIT) as a staff researcher. From 2010, he is working in the current position at Kyung Hee University. He published 84 SCI-indexed papers (cited > 1200, H index 18), 1 book chapter and tends of domestic (23) and international (35) patents. His interest in research is thermoelectricity, magnetism, and superconductivity. He currently do the research on quasi-one-dimensional charge and spin systems, topological Weyl semimetals, and electron & phonon transport on thermoelectric materials and their composites. He received several awards including TJ Park junior faculty fellowship (2013), funded by POSCO TJ Park foundation, Bombi Physics Award (2010) from Korean Physical Society, and Young Investigator Award by International Thermoelectric Society (2009).

Processing of Advanced Thermoelectric Materials

Jing-Feng Li
School of Materials Science and Engineering
Tsinghua University

Last two decades have witnessed significant progress in thermoelectric research, to which materials processing has crucial contributions. Compared with traditional zone-melting method used for fabricating bismuth telluride alloys, new powder-based processes have more freedom for manipulating nanostructures and nanocomposites. This lecture will give a comprehensive summary of materials processes ranging from solid-state reaction to soft chemistry with emphasis on processing principles and property enhancement mechanisms.

Biography

Jing-Feng Li is a "Changjiang scholar" distinguished professor and a vice dean of School of Materials Science and Engineering, Tsinghua University, and also serves as deputy director of Tsinghua University-Toyota research center. He graduated from Huazhong University of Science and Technology (China) in 1984 and obtained his PhD from Tohoku University (Japan) in 1991. After working in Tohoku University as assistant professor from 1992 to 1997 and then associate professor until 2002, he joined Tsinghua University as a full professor in 2002. His current research interests include thermoelectric and piezoelectric materials as well as their microfabrication technology. He has published >350 SCI-indexed papers (cited >8000, H index 50) and two books, and received several awards including young researcher award from the Japan Institute of Metals, outstanding young scientist grant from NSF of China, Journal of the American Ceramic Society Loyalty Award. Prof. Li is now an Editor-in-Chief of Journal of Materiomics and editorial committee members for several international journals including Journal of Asian Ceramic Societies and NPG Asia Materials.

Applicative Issues for Thermoelectrics

Woosuck Shin
Inorganic Functional Materials Research Institute
AIST

There have been significant progress in the research and development of thermoelectric materials with high figures-of-merit and also devices in various different forms and applications, sensors, coolers, and generators. Not only the thermoelectric generator materials characteristics but the designs of devices are important because the electron and thermal transport strongly effects the thermoelectric energy conversion and also affects system performance. This lecture will provide a review of various devices of thermoelectric materials from micro sensors to large power generators with the application requirements.

Biography

W. Shin received his BS and MS degrees in material science and engineering in 1992 and 1994 from KAIST, Korea. After receiving a doctorate in applied chemistry from the Nagoya University in 1998, he has been employed as Japanese government officer, at NIRIN Nagoya, Japan (at present, AIST). He was appointed senior research scientist in 2004, and the group reader of the electroceramics research group in 2011. In 2008, he was appointed a professor, Dept. Frontier Materials, Nagoya Institute of Technology, as subsidiary business. In 2010, he has founded a thermoelectric gas sensor company NAST co., and worked as CTO. He has developed various micro device technologies, sensor test method, and worked as Japanese expert in the working group for international standard, in ISO TC197. In 2013, he has won an achievement award in the 45th Ichimura Science Awards for his work on the development of thermoelectric device combined catalyst combustor and its applications.