Topic: Phase diagrams and green technologies: Electronic soldering and Thermoelectrics

Speaker: Sinn-wen Chen (Chair Professor and Senior Vice President, National Tsing Hua University)

Abstract:

Phase diagrams are the most concise media for materials phase equilibria descriptions. They are fundamentally important for materials' design and development, processing route selection and reliability assessment. This presentation discusses basic concepts, determinations and application of phase diagrams, and uses electronic soldering and thermoelectrics as illustration topics. Soldering is the most important joining technology in electronic products. Besides requirements of Pb-free solders, electronic soldering technologies evolve from traditional module soldering, to BGA, flip chip and 3D packaging. Thermoelectric modules can enhance energy usage efficiency by converting waste heat to electricity. When thermoelectric modules are used together with solar heating panels, they are renewable energy sources. This presentation discusses application examples of phase diagrams in the two important green technologies, electronic soldering and thermoelectrics, including nano-rod formation, unexpected dissolution rates, unexpected liquation and defect model understanding. Besides scientific discussion, National Tsing Hua University will be also introduced in this talk.

Vita:

Dr. Sinn-wen Chen is a Senior Vice President and Chair Professor of National Tsing Hua University in Taiwan. He received his Ph.D. degree in Materials Science from the University of Wisconsin-Madison, joined the Alcoa Technical Center, then he took a faculty position in the Chemical Engineering Department in NTHU in 1992.

He has been working on phase diagram determinations, solidification and interfacial reactions of electronic solders and thermoelectric materials. He is the author and co-author of 200 scientific journal papers and 10 patents. He is the President of Taiwan Institute of Chemical Engineers and publisher of the Journal of the Taiwan Institute of Chemical Engineers.

Professor Chen was a visiting professor to Lehigh University, Ecole Polytechnique de l'universite de Nantes, and University of Wisconsin-Madison. He is an Academician of the Asia Pacific Academy of Materials and a fellow of ASM International, Materials Research Society-Taiwan and Taiwan Institute of Chemical Engineers.