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Materials

The global economy is going strong as reflected by the U.S.'s GDP around 4%, Japan's recovery nearly 2%, EU's steady 1.5-2.0%, and China's hovering around 10%. Under this economic climate and the progressive globalization, all materials, commodity or advanced in micro- or nano-scale, are becoming increasingly crucial to the sustainability and the continued health of the economy within each nation and across the national borders.

When re-visiting the scope and definition of a material, discussions and debates always rise. A simple definition, according to the *Oxford English Dictionary* denotes that a material is the stuff from which an article, fabric or structure is made. While I was serving on a 12-member Committee on Globalization of Materials R&D commissioned by The National Academies and the U.S. Department of Defense, the consensus was to take on a more thorough definition: "Matter is a material when that form of matter has structural, optical, magnetic or electrical use." Further, being a relatively young formal discipline comparing with chemistry, physics and traditional engineering fields, the Materials Science and Engineering, over the last five decades, has made immense advancements, contributing to the well being of today's world. A perfect definition is hard to come by, yet any definition of the field must reflect the richness and diversity of all the activity related to materials.

Regardless of which definition to be adopted, Materials Science and Engineering is an interdisciplinary field by its own right. And materials, indeed, are the backbone of manufactured goods with usefulness to serve one or more designated functions, be it daily-use consumer goods, heavy-duty equipment, space shuttle or solar cell (Cover photo, courtesy of Ferro Corporation, depicts a polycrystalline solar cell's interface between the silicon wafer and the fired-on silver contact).

Going forward, the competitiveness across the industries relies on the efficient use of materials, further development of better materials and the relentless innovation of new materials for unique or desired properties and performance. The competitive edge stems from the visionary anticipation and intimate understanding of global trends and market drivers, in conjunction with the timely execution of broad-based knowledge and information.

The various forms of information flow help the industry sectors meet and exceed the challenge of designing future materials through the interdisciplinary approach. Within the microelectronics sector, for this special issue, I have invited three prominent professionals from the material community, representing the university, entrepreneurial business and corporation, to showcase their innovative "masterpiece" on materials. The first paper, authored by Professor D.D.L. Chung of University of New York at Buffalo, highlights the comparative performance of various thermal interface materials. The second paper, by Dr. Alan Rae of NanoDynamics, Inc., presents the superior properties imparted by using nanotechnology to enhance thermal material. The third paper, by Dr. Fay Hua, Carl Deppisch and Tom Fitzgerald of Intel Corporation, describes Indium as thermal interface material for high power devices. We thank all the authors for their contributions to this publication and to the materials community. Enjoy the reading.

Dr. Jennie Hwang received her Ph.D. in Material Science and Engineering and two M.S. degrees in Liquid Crystal Science and Chemistry, respectively. She has held senior executive positions with Lockheed Martin Corp., SCM Corp., Sherwin Williams Co, and IEM Corp. Currently, she is a principal of H-Technologies Group, providing business, technology and manufacturing solutions to the global industry. Among her many honors and awards, Dr. Hwang is elected to the National Academy of Engineering; inducted to the WIT International Hall of Fame; named R&D-Star-to-Watch and the recipient of Distinguished Alumni Awards from her alma maters. She has received the U. S. Congressional Certificate of Recognition and YWCA Women of Achievement Award. She has 300 publications to her credit including several internationally-used textbooks. An inventor of several patents, she has keynoted and lectured for many national and international events around the world and is a prolific author and speaker on workforce diversity, trade and business issues. Dr. Hwang has served as a board director for Fortune 500 NYSE, NASDAQ and private companies as well as on various civic and university boards. She has set an endowment fund at her alma maters, dedicated to interdisciplinary curricula and global exposures, and also established a YWCA Award recognizing outstanding women students in science and engineering. ♦