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## **Mitsubishi Chemical and UC Santa Barbara Form \$15 Million Research Alliance on Advanced Materials, Solid State Lighting and Displays**

Santa Barbara, Calif. -- Mitsubishi Chemical Corp., headquartered in Tokyo, and the University of California at Santa Barbara (UCSB) have entered into a five-year, \$15-million alliance to support research and education in advanced materials and in solid state lighting and displays. The alliance represents the largest sponsorship ever by a corporation of research at UC Santa Barbara.

Mitsubishi Chemical is supporting two research centers at UCSB: \$12.5 million will be allocated to establish the Mitsubishi Chemical Center for Advanced Materials (MC-CAM) and \$2.5 million to contribute to the funding of the Center for Solid State Lighting and Displays.

### Advanced Materials

MC-CAM's founding director is Glenn Fredrickson, UCSB professor of chemical engineering and department chair. Fredrickson explained, "The advanced materials on which the new center will focus are functional soft materials. These materials are 'functional' because they do something of value, such as a sensor responding to a stimulus in its environment. And the materials are 'soft' in that they have at least one organic component, meaning the presence of the element carbon as in a plastic (polymer) or biomaterial. Materials that are physically soft tend to be easy to process and to exhibit transport and diffusion properties that are controllable and therefore highly useful."

An example of an MC-CAM research focus is photonic band-gap materials, on which pioneering work has already been done by a group of UCSB scientists. The idea is to create from photonic band-gap materials a transistor for the switching of particles of light or photons in the way semiconducting materials have been used to create switches for electron flow.

Such a potentially transformative technology is what interests Mitsubishi Chemical in terms of the business model it is evolving for the 21st century, which emphasizes specialty-use chemicals with high profit margins. According to Chief Technology Officer George Stephanopoulos, "Mitsubishi Chemical Corp. has a set of research objectives and associated products that are downstream of the research objectives of the UC Santa Barbara's College of Engineering and science departments. Mitsubishi Chemical is well positioned to translate basic discoveries at UCSB into the marketplace for advanced photonic and electronic materials."

Matthew Tirrell, UCSB dean of Engineering, concurs, "As a College of Engineering we certainly want to influence technology. At some point we can't carry our research developments further into the technological arena; so industrial partners, with whom there is a good technical match, enable research results to be put into practice. And I think that is what we have found in Mitsubishi Chemical."

All three scientists point to the strength of the materials research effort at UCSB as the core reason for the

alliance.

An indication of that strength is the awarding of two 2000 Nobel Prizes, one in Chemistry and one in Physics, to two UCSB faculty with appointments in the Materials Department. Chemistry winner Alan Heeger was cited for discovery of conducting polymers; both Heeger and conducting polymers are directly relevant to the MC-CAM research agenda. Winning in Physics, Herbert Kroemer had insights into semiconductor heterostructures that are akin to the insights the photonic band-gap researchers hope to have.

"The basic research of our UCSB scientists in advanced materials and solid state lighting and displays has reached a point of technological breakthrough," said UCSB Chancellor Henry T. Yang. "This cooperation between Mitsubishi and UCSB is solidly founded on broad complementary strength between the two institutions in basic discoveries and product innovation."

MC-CAM Director Fredrickson estimates that the materials effort "involves some 100 UCSB faculty, working collaboratively in teams that transcend the traditional disciplinary divides."

Tirrell singles out "the Materials Research Laboratory under the visionary direction of [Materials Professor] Anthony Cheetham as pivotal to the research alliance between UCSB and Mitsubishi Chemical." Last fall the National Science Foundation awarded the Materials Research Laboratory (MRL) a renewal grant of \$16.5 million, the largest-ever research grant to the UCSB College of Engineering.

Housed within the College of Engineering, MC-CAM will be linked with the Materials Research Laboratory (MRL) administratively and physically in order to leverage the physical plant, professional staff, and research facilities and equipment of the MRL, while maintaining its autonomous research program. The MRL will, in return, benefit from MC-CAM's annual contributions to enlarge the research equipment base and staff support available to both centers.

In addition to Stephanopoulos, Fredrickson, and Tirrell, the MC-CAM governing board includes Martin Moskovits, UCSB dean of the Division of Mathematical, Life and Physical Sciences, and Ken-ichi Yoshie, president of the Mitsubishi Chemical Corp. Research and Innovations Center in Mountain View, Calif., who is also serving as MC-CAM's associate director.

A committee of 10, five from UCSB (including MRL Director Cheetham) and five from Mitsubishi Chemical (including MC-CAM Associate Director Yoshie) will exercise scientific oversight for MC-CAM by soliciting, shaping, and selecting research proposals.

Most of the Mitsubishi Chemical money will, according to MC-CAM Director Fredrickson, support student and postdoctoral researchers, and supplies and equipment for their research.

The University of California will own inventions ensuing from the research funded by Mitsubishi Chemical, which will have first option for exclusive license to the use of that technology. In addition, Mitsubishi will have the opportunity for a royalty-free nonexclusive license.

Solid State Lighting and Displays

Mitsubishi Chemical's support for the UCSB Center for Solid State Lighting and Displays is philanthropic.

The director of that center is Materials Professor Shuji Nakamura, the inventor of blue, green, and white Light Emitting Diodes (LEDs) and the blue laser. "We are very grateful for Mitsubishi Chemical Corp.'s generous endorsement of our efforts to develop solid state lighting and displays," said Nakamura.

One of the research goals of the center that interests Mitsubishi Chemical is, according to Nakamura, the use of short-wavelength blue light to excite phosphors to emit white light. Mitsubishi manufactures phosphors.

Mitsubishi Chemical Corp. is Japan's largest chemical company and the world's seventh largest chemical producer.

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