

Carnegie Mellon

Materials Science and Engineering Seminar Series

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*“Self-Assembly of Functional Composites for Storing, Generating
and Harvesting Photons and Electrons”*

Friday, September 18, 2009
10 A.M. Seminar in Baker Hall 136A

Over the past decade, the sophistication of self and directed-assembly approaches for functional composite structures has increased dramatically, however, application of such structures in real-world systems has remained largely elusive, in part because such structures almost always contain finite defect densities. The storing, generating and harvesting of photons and electrons presents a unique opportunity for self-assembled composite materials. These applications are not only generally much more defect tolerant than for example self-assembled computational electronics, but also for these areas to make a substantive impact on the world energy situation, they must be produced in exceptionally large volume. In my talk, I will attempt to capture the state-of-the-art in highly functional self-assembled three-dimensional composites for energy harvesting and storage illustrated with examples from both my research and other groups with a particular focus on high charge and discharge rate nanostructured electrochemical energy storage systems (batteries and supercapacitors), and photonic crystals which exhibit unprecedented control over the absorption and emission of light (lasers, LEDs, and solar cells). If time permits, I will also give examples of our work on self-healing coatings. This coating has the potential to dramatically reduce corrosion in a wide range of applications.

Professor Paul Braun received his BS degree with distinction from Cornell University, and his PhD in Materials Science and Engineering from the University of Illinois at Urbana-Champaign. Following a postdoctoral appointment at Bell Labs, Lucent Technologies, he joined the faculty at Illinois in 1999 as an Assistant Professor of Materials Science and Engineering, and as a member of the Beckman Institute and Materials Research Laboratory. He is now a Professor of Materials Science and Engineering and Chemistry, and has been the recipient of a Beckman Young Investigator Award (2001), a 3M Nontenured Faculty Award, the Robert Lansing Hardy Award from TMS (2002), the Willett Faculty Scholar Award (2002), the Xerox Award for Faculty Research (2004, 2009), the Burnett Teaching Award from the Department of Materials Science and Engineering (2005), and was named a University Scholar in 2006.