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Thursday, May 14, 2009
4:00pm / Refreshments at 3:45pm
Marine Science Research Building (Marine Science Institute)
Auditorium (room 1302)

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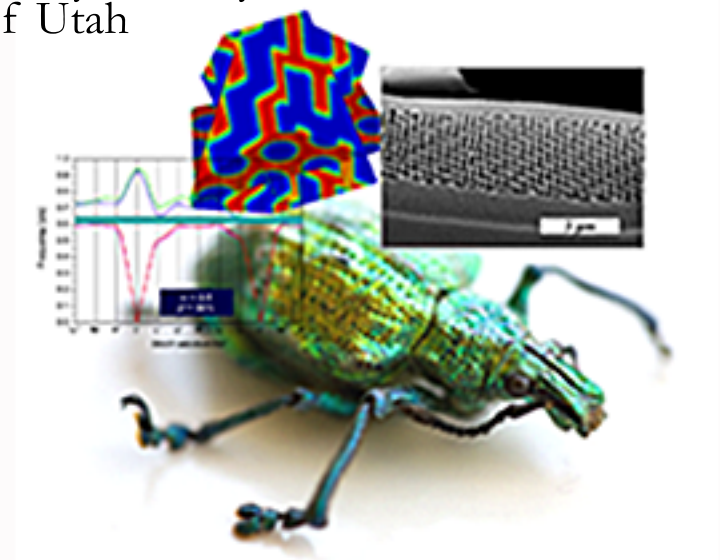

Three-Dimensional Photonic Band Gap Crystals from Biological Systems

The strikingly colorful world of insects is in large part the result of optical interference produced by the interaction of light with precisely ordered, periodic cuticular structures, incorporated into their exoskeletons. Such structural colors have recently gained tremendous interest for the use as photonic band gap crystals with enormous potential for next-generation energy and information technology concepts. While our current photonic engineering capabilities at visible wavelengths are rather limited, biological systems have evolved to create the most complex photonic architectures – structures that are still far out of our synthetic reach. For example, we discovered recently that the brilliant coloration of several beetles is the result of photonic structures with a diamond-based lattice – one of the most efficient photonic architecture. In this talk I will present fabrication routes that take advantage of the synergistic combination of photonic engineering in biology with sol-gel chemistry-based materials synthesis. Using this approach, we create novel photonic crystals with a complete band gap at visible frequencies as revealed by band structure calculations and multi-directional optical reflectance studies. Furthermore, I will discuss biomimetic self-assembly routes for photonic structure engineering based on biopolymer self-assembly/phase separation in spatially-confined environments.