

# NANO HOUR

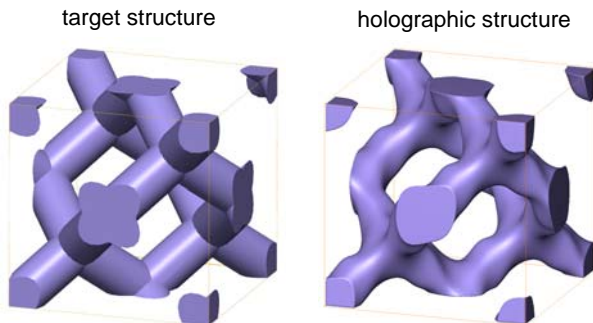
Wednesday, November 15, 2006

3:00 PM

Beckman Institute - Room 3269

## Holographic Design via Genetic Algorithm

James Rinne – Materials Science and Engineering



Holographic lithography is an attractive technique for the fabrication of three-dimensional (3D) photonic crystals. It relies on the concurrent exposure of four or more non-coplanar beams of coherent light to transfer a 3D interference pattern into photoresist. The relationship between a given set of beam parameters and the resultant structure is straight forward to understand within the general context of interference. However, the design of a given structure requires an understanding of the intractable *inverse* relationship between a structure

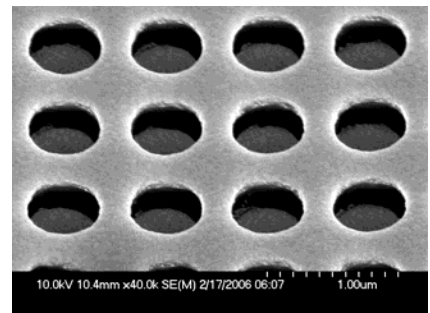
and the beam parameters that will produce it. In this work, we have developed a computational approach using genetic algorithms to reveal such inverse relationships. We have employed this new approach to design various structures of interest to the photonic crystals community. In particular, we demonstrate a diamond-like structure having an exceptionally large photonic band gap of 28%.

AND

## Plasmonic Crystals for Quantitative Multispectral Biosensing and Imaging

Matthew Stewart – Chemistry Department

We have developed a class of quasi-three dimensional plasmonic crystal that consists of multi-layered, regular arrays of sub-wavelength metal nanostructures. The complex and sensitive structure of the optical transmission spectra of the crystals makes them especially well-suited for quantitative multi-wavelength sensing applications. In addition, the high degree of spatial uniformity of the crystals, formed by a soft nanoimprint technique, provides the ability to image binding events over large areas with micron spatial resolution. These features, together with compact form factors, low cost fabrication, simple readout apparatus, and ability for direct integration into microfluidic networks and arrays, suggest promise for these devices in label-free bioanalytical detection systems..



Coffee and cookies will be served.

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