Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Periodic and Quasiperiodic Nanostructures: Accessing Complex Architectures Through Designer Phase Masks[1] CHEONG YANG KOH, EDWIN THOMAS, Massachusetts Institute of Technology — In this work, we show how one may design phase mask architectures in order to achieve complex 3-dimensional periodic and quasiperiodic nanostructures through considerations of the symmetries of the phase masks. By making use of the fact that phase mask interference lithography is essentially a case of light propagation through the non-modulated direction of a finite photonic crystal slab, we show that the diffracted beams obey the symmetry restrictions of the corresponding phase mask, which allow us to determine and design the polarizations and directions of the exiting beams which interfere coherently in the substrate, subsequently leading to the formation of 3-dimensional nanostructures which are periodic or quasiperiodic. The extension of this approach towards quasiperiodic structures is straightforward when working in Fourier space, which identifies the propagating eigen-modes within the phase mask, or photonic crystal slab. This allows us to rationally design structures with targeted properties, utilizing this Fourier space approach. We show several examples of this approach in achieving this method of fabrication for both periodic and quasiperiodic nanostructures.

[1]NSF, ISN

Cheong Yang Koh
Massachusetts Institute of Technology

Date submitted: 30 Nov 2007 Electronic form version 1.4