Nanophotonic Modeling
Lecture 1.13: Rod-Hole 3D Photonic Crystals

Prof. Peter Bermel
Rod-Hole 3D PhC

- Consist of alternating 2D PhC slab-like layers of rods and holes
Rod-Hole 3D PhC

- 3D bandgap is fairly large
- Dramatically different from the individual 2D PhC slabs
Rod-Hole 3D PhC

Cross-sectional view

Top view
Removing a single rod creates 3D confinement in a very small volume
Rod-Hole 3D PhC: Dielectric Defect

Similar 3D confinement also observed when increasing the radius of a single rod
Rod-Hole 3D PhC: Waveguide

Can create a waveguide much like in 2D PhCs by removing a whole row of rods
Rod-Hole 3D PhC: Surface States

Termination of 3D structure gives rise to surface states – cf. surface plasmons