

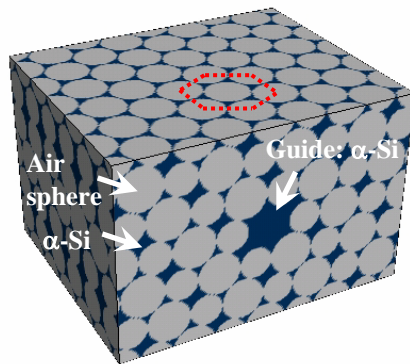
Inverse Opals for 3-D Photonic Crystal Waveguides

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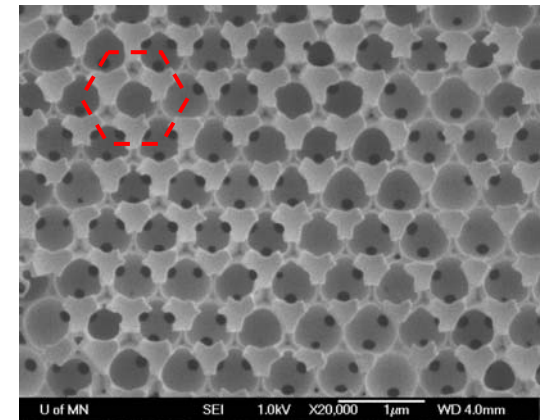
DESCRIPTION OF WORK

- ◆ Complete 3-D photonic bandgap (PBG)
- ◆ Embedded α -Si waveguide: line defect
- ◆ FDTD simulation: low propagation loss in PBG ($\lambda = 1520 \text{ nm} \sim 1590 \text{ nm}$)
- ◆ Opal (template): self-assembly of silica spheres
- ◆ Inverse opal: Infiltrated α -Si by LPCVD (tube32, NFC), etched air spheres by RIE (STS, NFC) & BOE

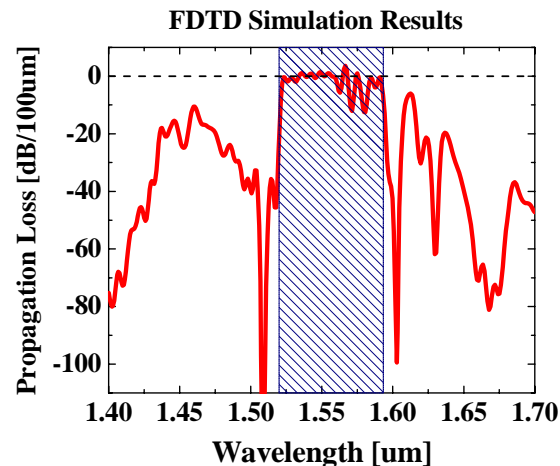


MAJOR OBSERVATIONS

- ◆ Inverse opals with air spheres & infiltrated α -Si
- ◆ FCC closed-packed structure
- ◆ Hexagonal shape in (111) direction
- ◆ Future works: fabrications of embedded waveguide in inverse opal & characterizations



SEM top-view image (JEOL 6500, CharFac)



Publications

- ◆ J.-U. Lee, K.-H. Baek, C. Olson, D.M. Kim, and A. Gopinath, "Simulation of Self-Assembled Photonic Crystals with Embedded Waveguide using FDTD Method", PERS, Cambridge, MA, 2006.
- ◆ J.-U. Lee, K.-H. Baek, C. Olson, D.M. Kim, and A. Gopinath, "Waveguide Embedded in Silicon Inverse Opal", IPRA, Uncasville, CT, 2006.