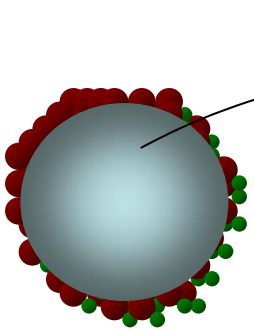
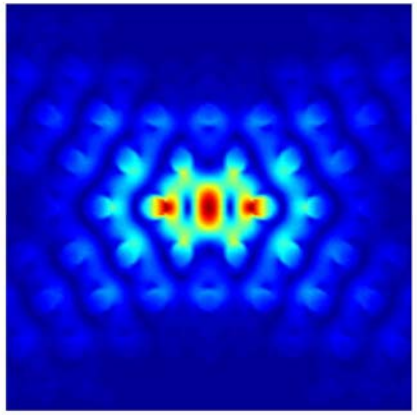
Jeff Young's group

Department of Physics and Astronomy, and AMPEL, UBC

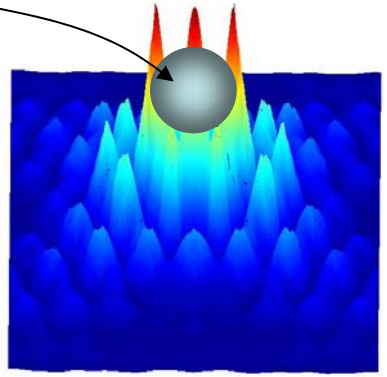
Chemically grafted nanoparticles



Quantum dot Nanoparticle
(~ 5nm PbSe)

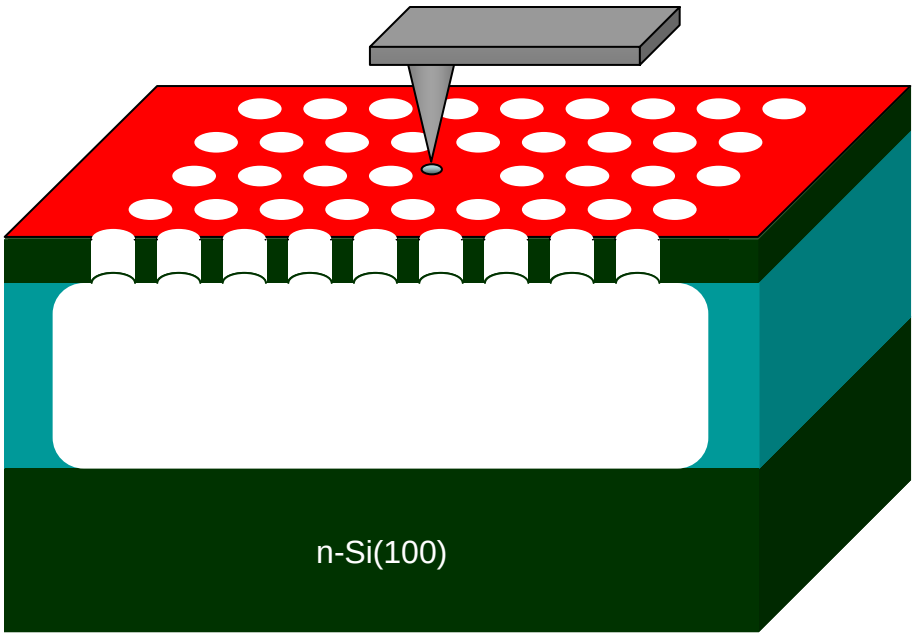


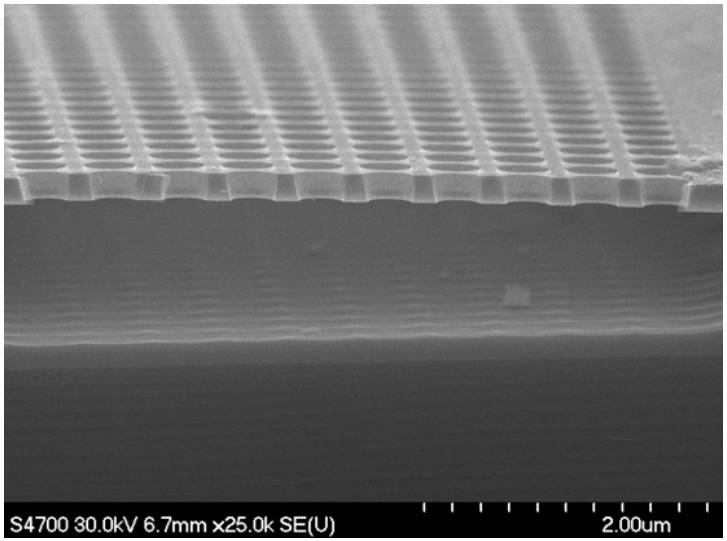
3D localized Microcavity mode in planar photonic crystal



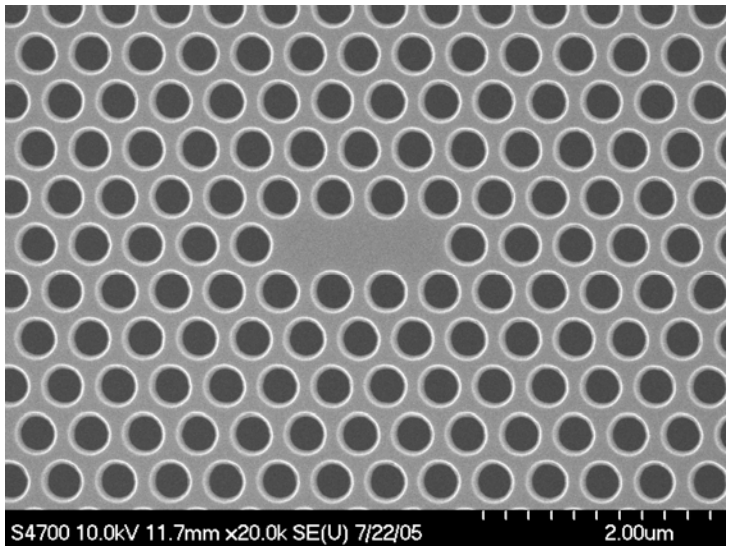
Schematic of coupled structure

Ebeam+AFM lithographies



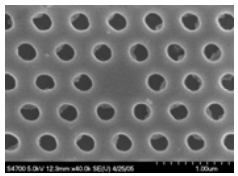


Anodize target area of processed SOI wafer with conducting atomic force microscope tip: tether nanoparticle to oxide dot, or H-terminated pit after HF etch

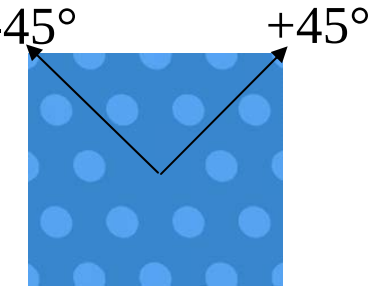


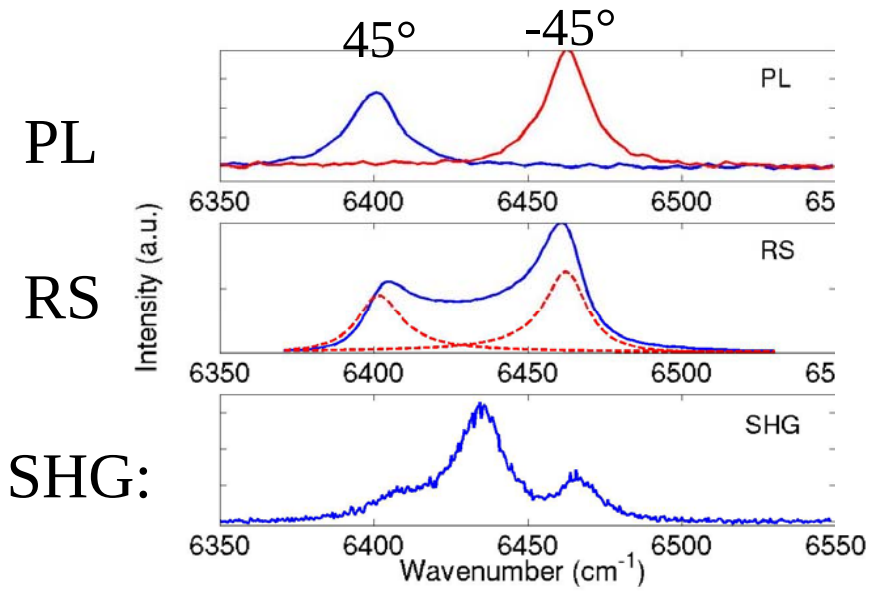
- “Bare” Q’s > 30,000
- Multi-mode, high Q cavities quite feasible (optical qubits?)

Many Quantum Dots, Low Q

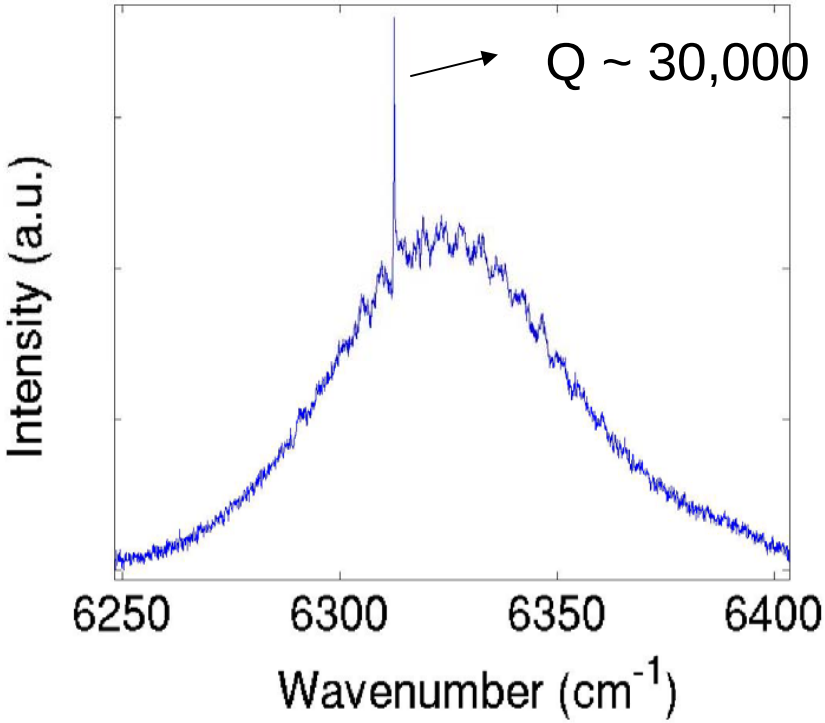


SEM image

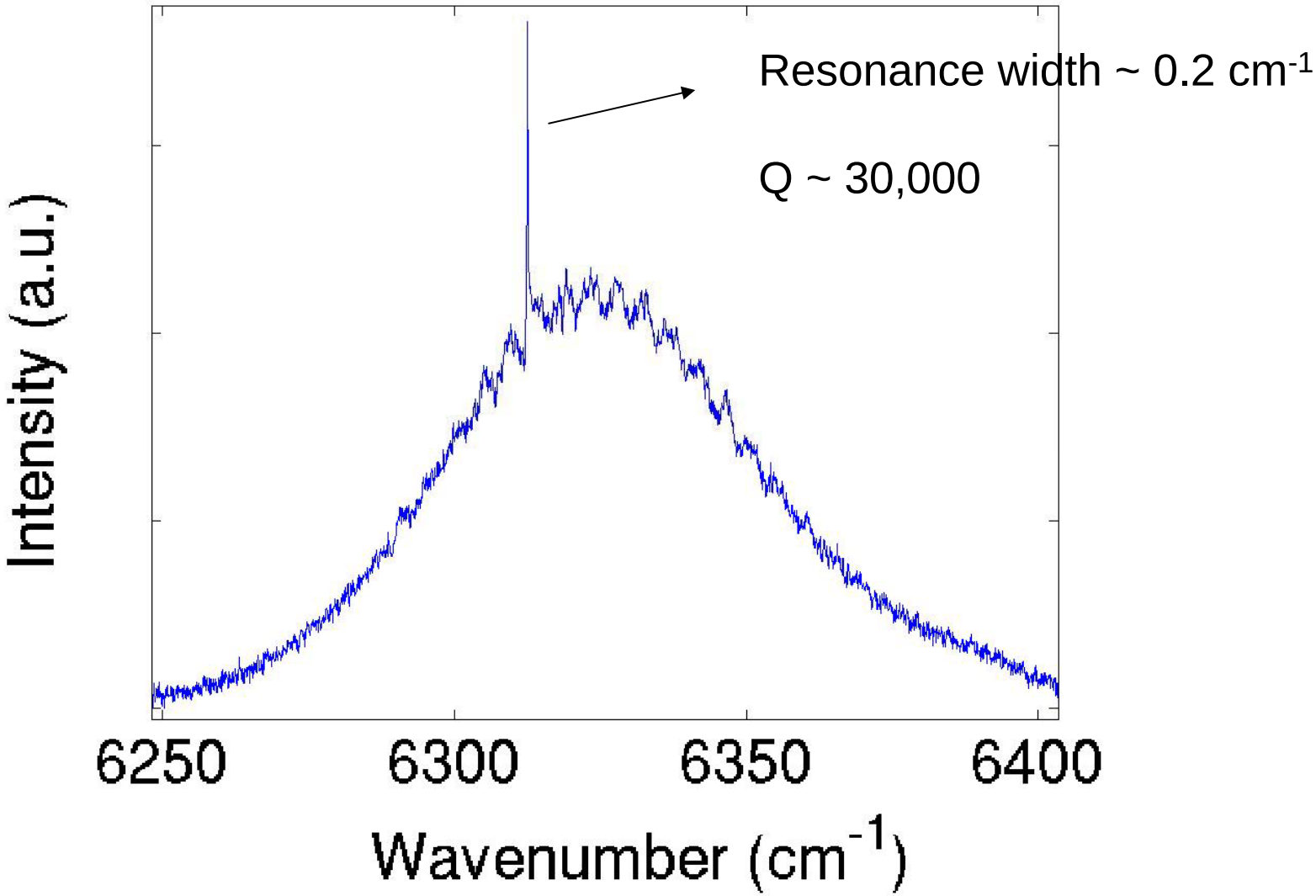




No Quantum Dots, High Q

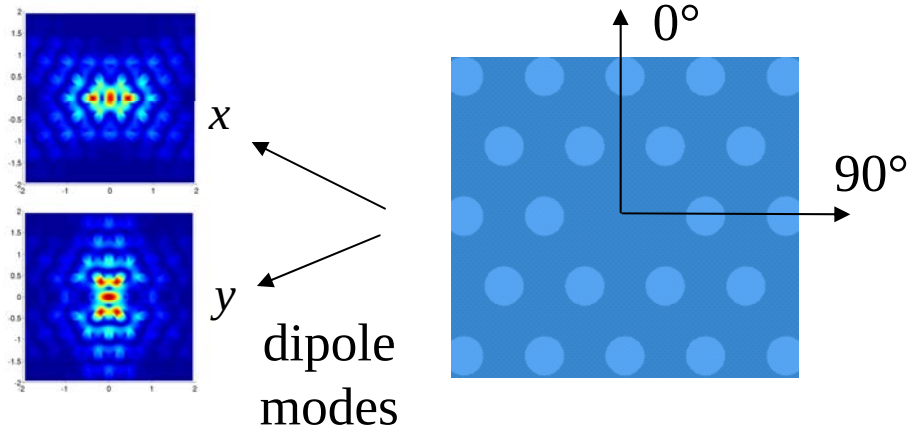


Lab record spectrum



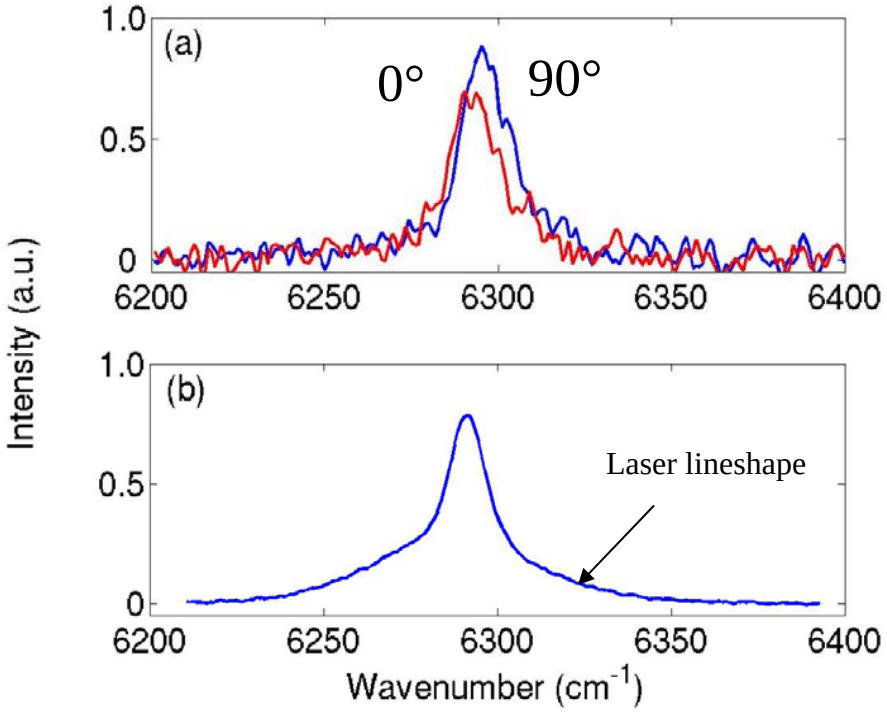
PL and Resonant Scattering

2 orthogonal modes

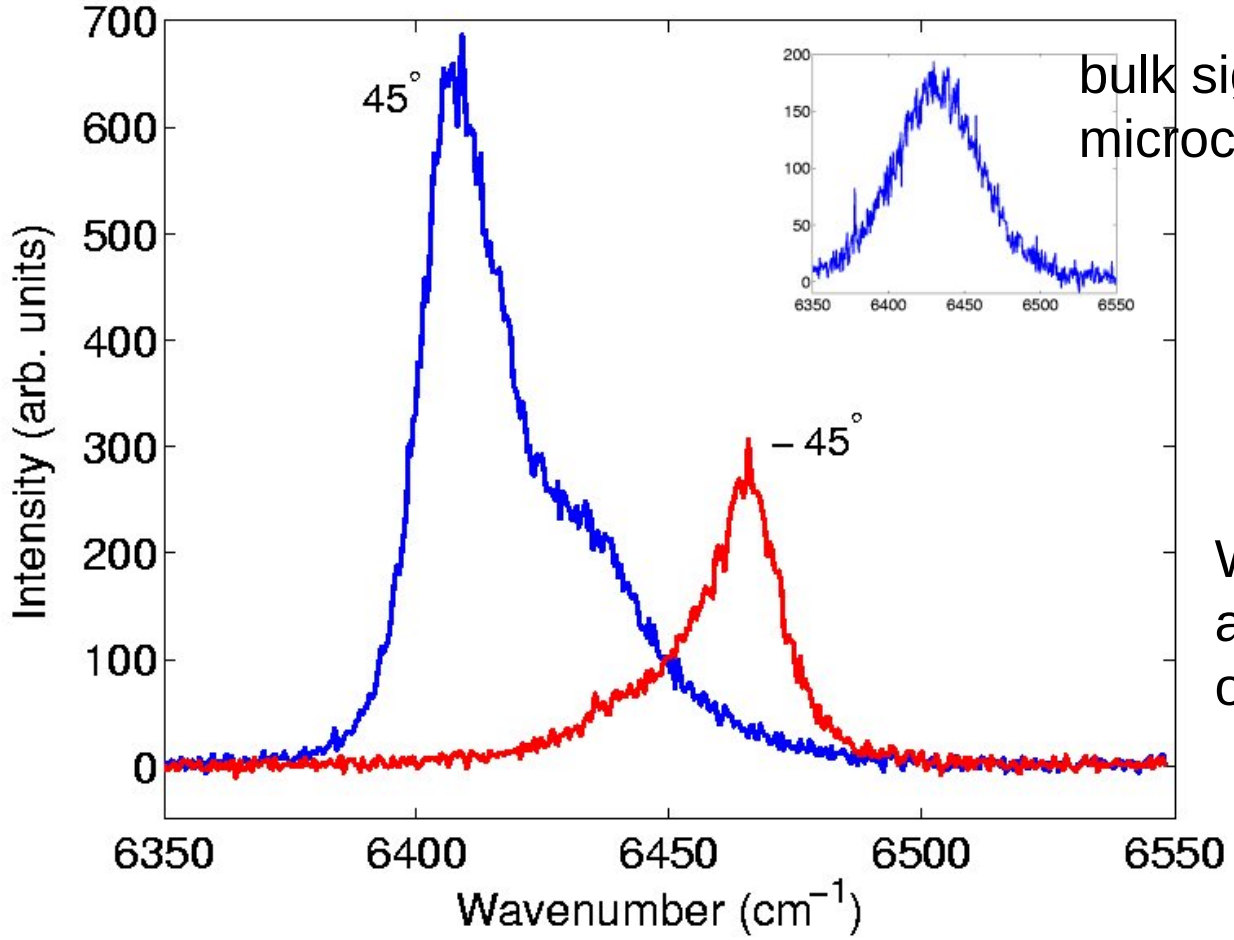


Photoluminescence (PL):

Resonant scattering:



Second harmonic generation



bulk signal (off microcavity)

Weak background allows isolation of single mode