

Photonic Nano-/Micro-structure Arrays for Photodetectors and Solar cells

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Nano-/micro-structured materials display light absorption properties that differ substantially from their bulk material due to the size dimension being much smaller than the wavelength of the incident light. Especially, silicon wires, 1-dimensional structures, are potential candidates for applications in optoelectronic devices due to their superior light absorption. On excitation, such silicon wires exhibit an ensemble of radial, Bloch, and Fabry-Perot modes that can be resonantly tuned through the manipulation of structural parameters. The tuning of optical qualities is a powerful tool and has applications in narrowband photodetectors and high-efficiency photovoltaics. In this presentation, we present two directions of research 1) active silicon nanowire spectral photodetectors and 2) 20%-efficient silicon microwire solar cells.