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Reconfigurable Infrared Phased-Array Semiconductor Metasurfaces JON SCHULLER, Univ of California - Santa Barbara — The ability to engineer the scattering *phase* of metamaterial constituents offers tremendous potential for constructing new classes of beam steering, shaping, and focusing technologies. Current methods for engineering phase rely on static geometry-based effects. In this talk we describe methods to *dynamically* tune the scattering phase of infrared semiconductor nanoantennas. We fabricate spherical silicon and germanium nanoparticles via femtosecond laser ablation and demonstrate size-dependent multipolar resonances throughout the infrared frequency range. We experimentally demonstrate that the resonance frequencies shift with doping, according to simple Drude models of free-carrier refraction. Using a combination of theoretical and analytical calculations we show that dynamically tuning free-carrier concentration can enable reconfigurable optical antennas and metasurfaces. Such dynamic tuning will enable reconfigurable photonic devices based on optical antenna and metamaterial concepts.

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