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Fabrication of hybrid GaP/diamond resonators for quantum information processing NICOLE THOMAS, University of Washington — Long spin coherence time and coupling of spin to optical transitions make nitrogen vacancy centers in diamond promising candidates for stationary qubits for quantum information processing. Their integration into photonic networks may allow for the measurement-induced entanglement of different spins through photon interference. One possible chip-based photonic entanglement network could consist of ring resonators for the enhancement of light emitted by the nitrogen vacancy centers, optical switches and waveguides. GaP is an ideal material choice for the fabrication of photonic networks in that it is transparent at the wavelength range of interest, provides a high refractive index for efficient waveguiding and electro-optic tuning capabilities for switching. We present two approaches to the fabrication and testing of hybrid GaP/diamond nanophotonic structures: (1) direct growth of GaP on diamond by molecular beam epitaxy and (2) transfer for a 200 nm thick GaP sheet from a bulk GaP/AlGaP/GaP sample to diamond. Disk resonators were fabricated via electron beam lithography and an anisotropic dry etch, and the resonator quality factor is measured.

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