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Refinement of ultra-enriched silicon for quantum electronics JOSHUA POMEROY, National Institute of Standards and Technology, KEVIN DWYER, ARUNA RAMANAYAKA, KE TANG, HYUN-SOO KIM, Joint Quantum Institute, University of Maryland, NIST TEAM, JQI TEAM — Nano-electronic device fabrication in epitaxial layers of 28-Si enriched at NIST to 99.99998% has been hampered by an unacceptable density of nitrogen, carbon and oxygen, while other contaminants are essentially absent. Highly enriched silicon is recognized as a critical material for solid state quantum information by offering a "semi-conductor vacuum" yielding very long quantum coherence times. Our method of enriching silicon uses ionization combined with magnetic field separation that can allow us to target specific enrichments and map out the fundamental dependence of quantum coherence on the enrichment level. In recent months, process and equipment improvements have successively reduced the density of these deleterious gasses, and this talk will provide an update of the current state of the purity and report on results from electrical test devices formed from this enriched silicon.

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