Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Isotopic enrichment and growth of material for quantum coherent devices KEVIN DWYER, NIST, University of Maryland, JOSHUA POMEROY, NIST — We demonstrate isotopic enrichment and growth of highly pure materials in support of quantum coherent devices. Efforts to produce devices capable of quantum computation rely on long coherence times of the electron or nuclear spin being used. Impurities with nuclear spin are a major cause of decoherence in such systems, and their elimination is essential towards longer T_2 realization. The produced material must be isotopically enriched as well as chemically pure and defect free, and we present an alternative method for achieving these goals. Unenriched material is ionized and filtered using a mass selecting magnet and then epitaxially deposited. As an initial check on enrichment, ^{22}Ne is implanted into Si demonstrating an isotopic selectivity over 1800:1 which extrapolates to a ^{28}Si enrichment better than 99.994%. In progression towards Si deposition from a silane precursor, methane is used as an analog to grow enriched ^{13}C on semiconductor grade silicon. Analysis of this material by SIMS and ESR as a check on estimated levels of isotopic and chemical purity is presented.

Kevin Dwyer
NIST, University of Maryland

Date submitted: 11 Nov 2011 Electronic form version 1.4