Focused Ion Beam Implantation by Deceleration

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Abstract

Ion implantation is a key capability for a growing number of scientific and industrial areas, including quantum information sciences, and the semiconductor industry. As devices become smaller, new materials and processes are introduced and quantum technologies transition to being mainstream, traditional implantation methods may fall short in terms of energy, species, and positional precision. In this talk we will show data demonstrating Au implants into Si at energies 10 eV– 450eV in a Raith Velion focused ion beam system by decelerating ions using bias and keeping the beam focused. The implants were validated using atom probe tomography. Our data reveal that standard implant modeling approaches fail to agree with experimentally measured depths, potentially due to surface sputtering and lattice enrichment. Finally, we discuss how our results pave a way to much lower implantation energies, while maintaining high spatial resolution.