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Efficient and scalable ionization of neutral atoms by an orderly array of gold-doped silicon nanowires IGAL BUCAY, AHMED HELAL, DAVID DUNSKY, ALEX LEVIYEV, AKHILA MALLAVARAPU, S.V. SREENIVASAN, MARK RAIZEN, University of Texas, Austin — Ionization of atoms and molecules is an important process in many applications and processes such as mass spectrometry. Ionization is typically accomplished by electron bombardment, and while it is scalable to large volumes, is also very inefficient due to the small cross section of electron-atom collisions. Photoionization methods can be highly efficient, but are not scalable due to the small ionization volume. Electric field ionization is accomplished using ultra-sharp conducting tips biased to a few kilovolts, but suffers from a low ionization volume and tip fabrication limitations. We report on our progress towards an efficient, robust, and scalable method of atomic and molecular ionization using orderly arrays of sharp, gold-doped silicon nanowires. As demonstrated in earlier work, the presence of the gold greatly enhances the ionization probability, which was attributed to an increase in available acceptor surface states. We present here a novel process used to fabricate the nanowire array, results of simulations aimed at optimizing the configuration of the array, and our progress towards demonstrating efficient and scalable ionization.

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