

Lawrence Berkeley National Laboratory

Recent Work

Title

Formation of integrated single atom arrays

Permalink

<https://escholarship.org/uc/item/1b34g31j>

Author

Nilsson, J.

Publication Date

2002-12-02

Abstract submitted to the APS March meeting, Austin TX, March 3-, 2003

Formation of integrated single atom arrays

T. Schenkel, J. Bokor, D. H. Schneider, A. Persaud, S. J. Park, and J. Nilsson

Several solid state quantum computer schemes are based on the manipulation of electron and/or nuclear spins of single ^{31}P atoms in a semiconductor matrix [1]. The fabrication of qubit arrays requires the placement of individual atoms with nanometer precision and high efficiency. We are developing a single ion implantation scheme for $^{31}\text{P}^{q+}$ ions, integrated with processing of control and readout structures [2]. Single ion implantation is achieved through detection of secondary electron bursts from the impact of highly charged dopant ions such as P^{12+} . We will present results on implant alignment, single dopant atom activation and damage repair and SET formation for fabrication of integrated qubit arrays.

[1] B. E. Kane, Nature 393, 133 (1998); R. Vrijen et al., Phys. Rev. A 62, 12306 (2000)

[2] T. Schenkel et al., SPIE V 4656, 10 (2002), J. Vac. Sci. Technol. B in press (2002)

Acknowledgments

This work was supported by the National Security Agency (NSA) and Advanced Research and Development Activity (ARDA) under Army Research Office (ARO) contract number MOD707501, and by the U. S. Department of Energy under Contract No. DE-AC03-76SF00098.