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Germanium based electrostatic quantum dots: design and characterization. GIOVANNI MAZZEO, Department of Electrical Engineering, University of California at Los Angeles, ELI YABLONOVITCH, Department of Electrical Engineering, University of California at Berkley, HONG-WEN JIANG, Department of Physics and Astronomy, University of California at Los Angeles — While the less mature Germanium technology requires an extra effort for the realization of single electron quantum dots, unique properties of Germanium rich heterostructures together with spin coherence times comparable to Silicon, can justify the development of such new technology. We report our progresses on the formation of electrostatic quantum dots in Germanium. We employ an MOS-like structure with no modulation doping already successfully proven in Silicon devices. A two level gate stack is used: the top gate is positively biased to attract electrons while the lowers gates are negatively biased to form the quantum dot and attract holes in a transistor channel, used to detect the electrons in the adjacent quantum dot. Finite Element Method simulations are used to prove the concept of this hybrid holes-transistor/electron-QD device and estimate the sensitivity of the charge detection. Preliminary characterizations of quantum dot devices built with this structure are reported.

Giovanni Mazzeo
Department of Electrical Engineering, University of California at Los Angeles

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