Abstract Submitted
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**Enhancement Single Electron Transistor for Quantum Computing**[1] B. HU, G. M. JONES, A. S. MAMPAHZY, C. H. YANG, Department of ECE, University of Maryland, College Park, MD, M. J. YANG, Naval Research Laboratory, Washington DC, Y. B. LYANDA-GELLER, Department of Physics, Purdue University, West Lafayette IN — We propose a novel scheme to build single spin quantum dots as the building block for quantum computing. In contrast to the depletion mode single electron transistors (SETs) commonly used for creating quantum dot qubits, our approach is based on an enhancement mode SET using InAs/GaSb composite quantum wells through bandgap engineering. The enhancement mode SETs host no electrons at zero applied voltage, compared to thousands of electrons in depletion dots to start with. When a voltage is applied to a single top metal gate, two symmetric tunneling barriers are created between GaSb and InAs quantum wells. These tunneling barriers define an InAs quantum dot and a single electron can tunnel there. This novel approach has a number of advantages for scalable quantum computing. In this talk, we will discuss the structure design, quantum dot simulation, and device fabrication. We will also present experimental results that provide proof-of-principle demonstrations.

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Chia-Hung Yang
University of Maryland

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