MAR14-2013-020423

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Directed Self-Assembly of III-V Semiconductor Nanowire and 2D Atomic Crystal Nanosheet Arrays for Advanced Nanoelectronic Devices[1]

THERESA MAYER, Departments of Electrical Engineering and Materials Science and Engineering, Penn State University, University Park, PA 16802

A variety of advanced materials and structures are being explored for next-generation ultra-low-power nanoelectronic devices to augment the capabilities provided by Si-based complementary logic. Interband tunneling field effect (TFET) transistors are particularly attractive because of their sub-60 mV/dec subthreshold swing (SS) and high current drive capabilities. This talk will provide an overview of recent progress to integrate abrupt, axially doped InGaAs nanowire TFET arrays and 2D atomic crystal nanosheets onto Si substrates using electric-field directed self-assembly. This strategy has enabled fabrication of the first lateral p^+-i-n^+ InGaAs nanowire TFETs with up to ten parallel aligned wires to study the effect of aggressive scaling on device figures of merit. Arrays of micron-scale, few-layer 2D layered group IV-monochalcogenide and transition metal dichalcogenide crystals are also being assembled for subsequent Hall and field-effect mobility measurements.

[1]STARnet LEAST Center