BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA

INSTITUTO DE FÍSICA
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SEMINARIO

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"Towards Non-Volatile Random Access Memory (NV-RAM)"

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The non-volatile memory market has been driven by Flash memory for the last two decades. Nowadays the Flash memory is used for a wide variety of devices and systems from personal pen drives and mp3 players to planes or satellites. However, the conventional floating-gate memory technology in use for the Flash is facing a serious scalability issue as manifested in ITRS2007; the oxide layer cannot be reduced smaller than 7 nm. As one of promising candidates for a scalable non-volatile memory, we proposed a new suspended-gate silicon nanodot memory (SGSNM) by co-integrating nanoelectromechanical systems (NEMS) and conventional MOSFETs. The SGSNM consists of a MOSFET as readout, silicon nanodots (SiNDs) as a floating gate (FG), and a movable suspended gate (SG) which is isolated from the FG by an air gap and a thin oxide layer. The advantages of the SGSNM cell over the typical flash memory include high speed programming/erasing operations, virtually no gate leakage current and therefore a serious non-volatility, thanks to the presence of the air gap except for the program/erase processes. For programming the SGSNM cell, a negative gate voltage is applied, and the SG is pulled-in on the FG layer, resulting in electron injection from the SG into the FG. For erasing the cell, a positive voltage is applied, and the stored electrons are extracted from the FG.

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