

Notice and Invitation
Oral Defense of Doctoral Dissertation
The Volgenau School of Engineering, George Mason University

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Novel Molecular Memory on Si and Two-Dimensional Materials

Wednesday, April 24, 2019, 2:00pm - 4:00pm
Engineering Building, Room 3507
All are invited to attend.

Committee

Dr. Qiliang Li, Chair
Dr. Sujitra J Pookpanratana
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Dr. Rao V Mulpuri
Dr. Patrick Vora

Abstract

The global market for the next generation non-volatile memory is expected to reach \$15 billion by 2026. The demand for high density, high reliability and low-power consumption memory rises exponentially due to the continuously increasing need of smart phones, tablets and wearable devices. In this dissertation, flash-like nonvolatile memory devices based on Si and organic molecules have been fabricated and characterized. The devices containing redox-active molecules which are covalently attached on Si exhibit excellent Program/Erase (P/E) speed, good retention and excellent endurance. The charge storage in the molecule-containing memory is derived from the intrinsic redox processes of the molecules under voltage bias, which is very robust in comparison with the other flash memory based on floating gate or traps. In addition, approaches of the redox-molecule attachment on two-dimensional materials have been explored. The redox-active molecular flash memory based on two-dimensional materials have been fabricated and characterized. The results indicated that the redox-active molecules are very attractive materials for next-generation memory application.