Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Magnetic memory and logic based on spin effects in graphene[1]
JOHN ZAVADA, YURIY SEMENOV, KI WOOK KIM, NCSU — We report on a novel approach to the problem of low-power-consuming non-volatile magnetic random access memory (MRAM) and logic design that is based on the unique properties of the graphene placed in interface between two magnetic dielectric layers. We find that by combining the electrical effect on the exchange bias field and a giant magnetoresistance effect of the graphene/ferromagnet hybrid structures, a new non-volatile MRAM device is possible. In such a device an electric bias realizes the low energy writing bits instead of an external magnetic field with high energy consumption. In particular, the structure under consideration consists of a three ferromagnetic dielectric layers, which are coupled through monolayer and bilayer graphene films. Interplay of two graphene layers can mediate the exchange bias fields applied to different sides of the free ferromagnets resulting in programmable logic operations.

[1]This work was supported in part by the DARPA and the FENA

John Zavada
NCSU

Date submitted: 21 Nov 2008 Electronic form version 1.4