Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Spin Dependent Transport in Graphene Nano Ribbon Devices[1]
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Graphene is now one of the promising materials for future nanoelectronics. Especially graphene nanoribbon is attracting great attention since it possesses finite bandgap opening depending on the ribbon width and the transport orientation with respect to the graphene lattice. Another interesting property seen in graphene nanoribbon is the appearance of the "edge-spin" polarization at the edges of the zigzag-edged graphene nanoribbon. Recently it has been shown that such edge- spin polarization can be electrically controlled to induce the half-metallic band structure in such structures, meaning the electrical controllability of the spin current in such material. Therefore, toward the realization of the graphene nanoribbon spintronics, it is now important to study the spin- dependent transport characteristics in realistic device structure based on zigzag graphene nanoribbon. Here we present our numerical study of spin transport in zigzag-edged graphene nanoribbon transistor structures [1] using spin-density functional tight-binding method. Special attention is paid to the influence of edge roughness and electrostatic doping on the spin polarization and the spin current. [1] S.Souma, M.Ogawa, T.Yamamoto, K.Watanabe, J.Comp. Electron. 7, 390 (2008).

[1]This work was supported by KAKENHI (18749006)

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Date submitted: 07 Dec 2008 Electronic form version 1.4