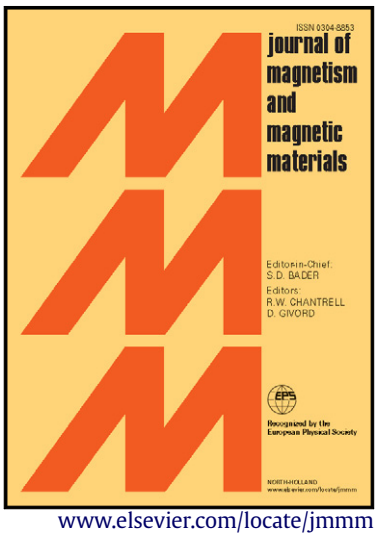

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PII: S0304-8853(14)00815-4
DOI: http://dx.doi.org/10.1016/j.jmmm.2014.08.095
Reference: MAGMA59358

To appear in: *Journal of Magnetism and Magnetic Materials*

Received date: 27 March 2014
Revised date: 9 August 2014

Cite this article as: Assanai Suwanvarangkoon, Bumned Soodchomshom, Giant tunneling electroresistance in ferroelectric-gated silicene junction, *Journal of Magnetism and Magnetic Materials,* http://dx.doi.org/10.1016/j.jmmm.2014.08.095

Giant tunneling electroresistance in ferroelectric-gated silicene junction

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Abstract

The electroresistance in silicene-based normal/ferroelectric-gated/normal junction is investigated. The energy gap in silicene can be tuned by electric field. The spontaneous electric polarization in ferroelectric (FE) can be switched by external electric field. Due to the combination of these properties, we find that the studied junction may generate tunneling electroresistance (TER) exceeding 10^9 %. The conductance ratio between ON and OFF-states, G_{ON} /$G_{OFF,}$ is found to be larger than 10^7, enhanced by increasing the thickness of the barrier or increasing the magnitude of electric polarization in the FE-layer. The giant TER effect is directly related to the buckled lattice and the presence of spin orbit interaction in silicene. This work reveals the potential of silicene as a good material for application of ferroelectric random-access memory.

Keywords: Silicene; ferroelectric; electroresistance; ferroelectric RAM;