Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Tunnel spin injection into graphene through ALD-grown tunnel barrier TAKEHIRO YAMAGUCHI, IIS, Univ. of Tokyo, SATORU MASUBUCHI, IIS and INQIE, Univ. of Tokyo, KAZUYUKI IGUCHI, RAI MORIYA, IIS, Univ. of Tokyo, TOMOKI MACHIDA, IIS and INQIE, Univ. of Tokyo, and PRESTO-JST — Graphene is a promising material for spintronics devices because of its long spin relaxation time due to weak spin-orbit interaction and hyperfine interaction. For the spintronics, it is very essential to develop a reliable method to inject spin polarized electrons into graphene from ferromagnetic electrodes. In this study, between ferromagnetic electrodes and graphene we fabricated a new type of Al_2O_3 tunnel barrier grown by atomic layer deposition (ALD). Before ALD of Al_2O_3, we functionalized the surface of graphene with a self-assembled monolayer of 3, 4, 9, 10 perylene tetracarboxylic acid (PTCA) to improve adhesion and growth of Al_2O_3. Using ALD-Al_2O_3/PTCA composite barrier, large nonlocal magnetoresistance of 30 Ω was observed at 45 K. Nonlocal magnetoresistance reached maximum around charge neutrality point, and $I - V$ characteristics of the contacts are nonlinear. These results indicate the achievement of tunnel spin injection into graphene, revealing potentially high performance of ALD-Al_2O_3/PTCA tunnel barrier [1]. [1] T. Yamaguchi et al., J. Magn. Magn. Mater. (2011), doi: 10. 1016/j.jmmm. 2011. 09. 031

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Date submitted: 11 Nov 2011 Electronic form version 1.4