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Interface control of spin transport in magnetic tunnel junctions with MgO\Cu-Phthalicyanine hybrid barrier[1] YU JEONG BAE, NYUN JONG LEE, TAE HEE KIM, Department of Physics, Ewha Womans Univ, ANDREW PRATT, YASUSHI YAMAUCHI, National Institute for Materials Science — In this work, systematic investigation of interface electronic properties in Fe(001)\MgO(001)\Cu-Phthalocyanine (CuPc) and Fe(001)\CuPc was carried out by using spin polarized metastable He de-excitation spectroscopy (SP-MDS) technique. The electronic structure related to the absorption geometry of CuPc on the Fe (001) and MgO(001) was carefully explored. Differences in the spin resolved density of states were observed as a function of CuPc thickness. The clear evidence of spin-polarized organic spinterface appears even at room temperature in ultra-thin (¡ 2 nm) CuPc films on the epitaxially grown Fe(001)\MgO(001) bilayer. These findings have significant implications for understanding of spin injection from a ferromagnetic layer into an organic semiconductor (OSC), and highlight the importance of adsorption geometry and interfacial exchange coupling in the process of spin injection. This is demonstrated in measurements of the spin transport of Fe\MgO(001)\CuPc\Co tunnel junctions. For the MgO\CuPC hybrid barrier, high magnetoresistance value ($> 100\%$) and rather small value ($\sim 10\%$) were measured at 77 K and 300 K, respectively. Our results provide significant new insights into the phenomenon of spin injection into an OSC and the operation of molecular spintronic devices.

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