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Spin transport studies through spin filter and organic semiconductor hybrid tunnel barriers[1] DEUNGJANG CHOI, Ewha University, TIFFANY SANTOS, Argonne National Lab, TAE HEE KIM, Ewha University, JAGADEESH MOODERA, Francis Bitter Magnet Lab, MIT — Spin polarized tunneling through a hybrid tunnel barrier of spin filter EuO magnetic semiconductor and an organic semiconductor Rubrene was investigated. With magnetic tunnel junction structures such as Co/Rubrene/EuO/Al or Cu we observed a magnetoresistance (MR) of up to 8.5%, whereas from the junction resistance versus temperature data, we deduced the capability to produce spin polarization (P) of up to 99%. Thus the observed low MR has been attributed to spin scattering by defects at various EuO and Rubrene interfaces and possible nonstoichiometry in EuO. With further optimization it should be possible to reach towards the expected large MR in such systems. Moreover, Rubrene which has a low barrier height also serves to magnetically decouple the ferromagnetic electrode from EuO, necessary for independent magnetic switching and reaching high MR. This study demonstrates the possibility of combining organic and spin filter materials as tunnel barriers.

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