

## Spin Transport Studies through Spin Filter and Organic Semiconductor Hybrid Tunnel Barriers

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Organic spintronics is a new area that is rapidly growing in interest. Tunneling transport of spin polarized carriers through a hybrid tunnel barrier of spin filter EuO magnetic semiconductor and an organic semiconductor Rubrene was investigated. Quasi-magnetic tunnel junction structures such as Co/Rubrene/EuO/Al or Cu were utilized for this and successful spin tunneling was observed. Various thicknesses of Rubrene and EuO were investigated. We observed a magnetoresistance (MR) of up to 8.5%, whereas from the junction resistance versus temperature data, we deduced a possible spin polarization (P) of up to 99%. The inconsistency of seeing a low MR and a high P has been attributed to spin scattering by defects at interfaces, EuO and Rubrene interfacial intermixing and nonstoichiometry. This needs further studies to optimize defects and hence raise MR to reflect the high P. This study demonstrates the possibility of combining organic and spin filter materials as tunnel barriers. Significant outcome of this study is showing the possibility to inject spins into organic materials via spin filter barriers.

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