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On the Mechanism Causing Large Room-Temperature Magnetoresistance in OLEDs Y. SHENG, T. NGUYEN, Dept. of Phys. & Astr., Univ. of Iowa, G. VEERARAGHAVAN, Dept of Elec. & Comp. Engr., Univ. of Iowa, J. RYBICKI, Dept. of Phys. & Astr., Univ. of Iowa, O. MERMER, Univ. of California, Santa Barbara, M. WOHLGENANNT, Dept. of Phys. & Astr., Univ. of Iowa — We report on the experimental study of a recently discovered, large room-temperature magnetoresistance effect in sandwich devices comprised of nonmagnetic electrodes and various organic semiconductor thin films. The effect reaches up to 10% in a magnetic field of 10 mT at room temperature and saturates at fields larger than several tens of milliTeslas. In materials with strong spin-orbit coupling the characteristic magnetic field scale shifts to fields that are 10-100 times larger, consistent with the spin-orbit coupling strength. Our experiments therefore show that the organic magnetorestive effect is caused by spin-dynamics, possibly induced by the hyperfine interaction. We discuss two recently proposed models to explain the organic magnetorestive effect, which are based on spin-dependent exciton formation and spin-dependent hopping, respectively.

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