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Magnetic fringe field control of electronic transport in an organic film[1] MARKUS WOHLGENANNT, FUJIAN WANG, University of Iowa, FERRAN MACIA, ANDREW KENT, New York University, MICHAEL FLATTE, University of Iowa — Random nuclear hyperfine fields in organic materials dramatically affect electronic transport properties such as the electrical (photo)conductivity and electroluminescence. The influence of these nuclear hyperfine fields can be overwhelmed by a uniform external applied magnetic field. As a result, in applied magnetic fields of about 10mT the kinetics of exciton formation, bipolaron formation, and carrier hopping are all modified, leading to changes in room-temperature electrical transport properties in excess of 10 % in many materials. Here we demonstrate a new method of controlling the electronic transport in an organic film, using the spatially-varying magnetic fringe fields of an unsaturated ferromagnetic electrode. The effect of these magnetic fringe fields is hysteretic, anisotropic, and depends sensitively on the distance of the organic material from the ferromagnetic electrode; all these effects appear in the magnetic-field dependences of electronic transport in these films. Such structures, which do not rely on spin injection or spin-valve behavior, may provide a simple approach to integrating magnetic metals and organics for hybrid spintronic devices.

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Markus Wohlgenannt
University of Iowa

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