DS 30: Invited – Johnston-Halperin

Time: Wednesday 15:00–15:45 Location: GER 37

Invited Talk DS 30.1 Wed 15:00 GER 37

Electrical spin injection in a hybrid organic/inorganic spin-polarized light emitting diode (spin-LED) — •Ezekiel Johnston-Halperin — Department of Physics, The Ohio State University, USA

The development of organic-based magnets with room temperature magnetic ordering and semiconducting functionality promises a route to all-organic spintronic devices and hybrid organic/inorganic structures capable of exploiting both the multifunctionality of organic systems as well as the established spintronic functionality of inorganic materials. Here we report the successful extraction of spin polarized current from a thin film of the organic-based room-temperature ferrimagnetic semiconductor V[TCNE]x (x˜2; TCNE: tetracyanoethylene) and its subsequent injection into a GaAs/AlGaAs light-emitting diode (LED). The orientation of this spin current is determined by polarization analysis of the electroluminescence from the LED and is found to be parallel to the magnetization of the V[TCNE] layer, in agreement with theoretical predictions. Detailed analysis of the optical selection rules in the LED, coupled with control measurements of magnetic circular dichroism in the V[TCNE] layer, reveals the magnitude of the electron spin polarization to be largely insensitive to both electrical bias and temperature. This successful demonstration of spin injection in a hybrid organic/inorganic structure opens the door to a new class of active, hybrid spintronic devices with the potential for multifunctional behavior defined by the optical, electronic and chemical sensitivity of the organic layer.