Long range spin transport in disordered organic solids

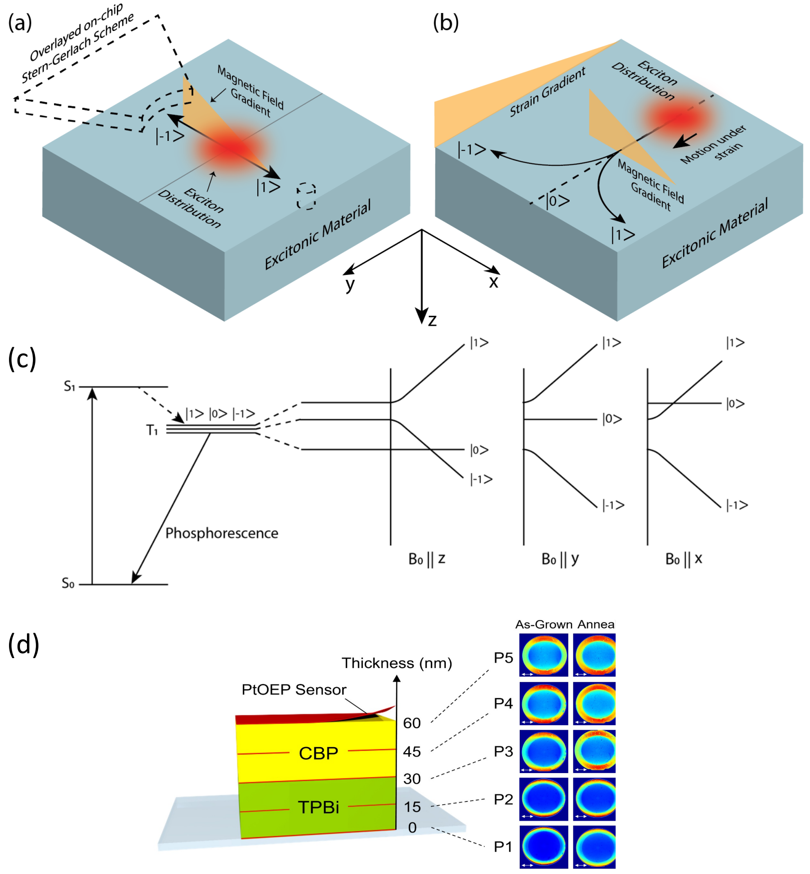

Figure: (a) Schematic of the expected spin transport with the on-chip Stern-Gerlach geometry. Spin separation occurs along +x and -x direction. (b) Schematic of the expected spin transport assisted with exciton drift due to strain. Spin separation occurs along +x and -x direction, while excitons drift along +y direction. (c) The spin manifolds and Zeeman effect in organic molecules. (d) Metal-carbene TADF as a candidate material system. Temperature-controlled singlet/triplet conversion and population is via fast intersystem crossing and reverse intersystem crossing.

Objective

➢ To investigate novel photophysical and magnetic properties that arise due to energetic interactions in organics and across organic/inorganic heterointerfaces based on spin transfer and transport under external or internal magnetic fields

Impact

Stern-Gerlach geometry is used to induce spin separation in an excitonic material. This allows for the potential to achieve long range spin control and transport governed by triplets in organics. Additionally, on-chip nanoscale spin transport could be realized, enabling applications in spintronic devices.

Facilities and Methods Used

- Transient photoluminescence
- Lithography
- Vapor thermal evaporation
- Nearfield scanning optical microscopy
- Fourier space microscopy

Relevant Papers

- Shi S, et al., *JACS*, DOI: 10.1021/jacs.8b12397 (2019)

Funding

- U.S. Department of Defense

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