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Photo-induced Magnetism and Spintronics in Organic Semiconductors[1]

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Recent years have witnessed growing attention on manipulating spins in organic species. One of the interesting phenomena in organic-based magnets is controlling magnetic properties by optical stimulus, a property not exhibited in metallurgical magnets. Three classes of known phenomena and mechanism will be discussed: i) manipulation of number of spins by optically induced charge transfer in cyano-bimetallic complexes [1], ii) optical control of exchange coupling in $Mn(TCNE)_2$ compound [2], iii) light-induced change of magnetic anisotropy in the magnetic semiconductor $V(TCNE)_x$ [3]. The second part of this talk will be devoted to ongoing research on transferring spin polarized carriers through organic semiconductors. Recently, there have been lively activities as well as controversies on the application of organic semiconductors for transporting spin information. However, the understanding of spin injection and transport in organic semiconductors is still limited. We will address detailed mechanisms for spin injection and transport in organic semiconductor film of our rubrene ($C_{42}H_{28}$)-based spin valve and potential applications of organic-based spintronics.

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