Chiral Induced Spin Selectivity

From 2013-10-01 to 2018-09-30, ongoing project

Objective

The overall objective is to fully understand the Chiral Induced Spin Selectivity (CISS) effect, which was discovered recently. It was found that the transmission or conduction of electrons through chiral molecules is spin dependent. The CISS effect is a change in the paradigm that assumed that any spin manipulation requires magnetic materials or materials with high spin-orbit coupling. These unexpected new findings open new possibilities for applying chiral molecules in spintronics applications and may provide new insights on electron transfer processes in Biology.

The specific goals of the proposed research are

(i) To establish the parameters that affect the magnitude of the CISS effect.
(ii) To demonstrate spintronics devices (memory and transistors) that are based on the CISS effect.
(iii) To investigate the role of CISS in electron transfer in biology related systems.

The experiments will be performed applying a combination of experimental methods including photoelectron spectroscopy, single molecule conduction, light-induced electron transfer, and spin specific conduction through magneto-electric devices. The project has a potential to have very large impact on various fields from Physics to Biology. It will result in the establishment of chiral organic molecules as a new substrate for wide range of spintronics related applications including magnetic memory, and in determining whether spins play a role in electron transfer processes in biology.

Related information

Report Summaries

Mid-Term Report Summary - CISS (Chiral Induced Spin Selectivity)

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**Subjects**

Physical sciences and engineering

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