

The role of the electron's spin in closed shell chiral systems

Ron Naaman

Dep. of Chemical and Biological Physics, Weizmann Institute, Rehovot,
Israel

Email: ron.naaman@weizmann.ac.il

Abstract

Spin based properties, applications, and devices are commonly related to paramagnetic or magnetic molecules and materials. However, in the case of chiral molecules or materials, any electric field breaks the entanglement of the electrons in the singlet state. This effect results in interesting properties related to the interaction among chiral objects and between them and magnetic elements. The new effects will be described and their manifestation in spin selective chemistry and enantiospecific interactions will be described.

The phenomenon is related to the Chiral Induced Spin Selectivity (CISS) effect and it was found, among others, in bio-molecules and in bio-systems as well as in chiral oxides and in chiral perovskites. It has interesting implications for the production of new types of spintronics devices, in controlling magnetization, and on electron transfer and conduction. It also enables the introduction of new type of catalysts, especially for oxygen related processes.