

# NANOSCIENCE COLLOQUIUM

## Chirality-induced Spin Selectivity

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### ABSTRACT :

About a decade ago, an unexpected behavior of electrons was observed, namely that they become spin polarized when traversing a helical molecule. This holds true for low-energy electrons up to a few eV kinetic energy, the electrons being longitudinally polarized, and a monolayer of molecules is sufficient to generate high spin polarizations at room temperature. The effect has been baptized chirality-induced spin selectivity (CISS). With spin analysis this phenomenon was first observed for oligo-DNA, later also for oligo-peptides and even for bacteriorhodopsin. Besides photoemission experiments, this CISS effect is meanwhile also observed in transport measurements with a conducting AFM tip, in STM studies, and with electrochemical probes. Besides in biomolecules, the effect has been observed with large (up to 80 %) spin polarizations also in small organic molecules and in chiral solid-state systems. With the latter systems electrochemical reactions which require a spin change become significantly more efficient.

An overview of different manifestations of CISS will be given with an emphasis on direct spin measurements in photoemission using Mott scattering. Various attempts to enlighten the theoretical understanding of the effect will be discussed.

