

Frontiers in Spin Polarized Tunneling

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Electron tunneling phenomenon has richly contributed to our understanding of various branches of physics over the years. Spin polarized tunneling (SPT), sensing of the spin polarization of tunneling electrons using a spin split superconducting spin detector, discovered by Meservey and Tedrow forty years ago has led to many recent breakthroughs. SPT has set the field of spintronics into an extremely active field since many years. In this overview talk we will cover the field starting from its origin to tunnel magnetoresistance (TMR) effect, spin filtering, spin tunneling in organic semiconductors to tuning of superconducting state with spin current. Electrical spin injection/detection in a semiconductor including graphene, currently one of the most active areas, is strongly believed to succeed through the SPT approach. The successful observation of a large change in tunnel current in magnetic tunnel junctions (MTJ) in the mid nineties has brought extreme activity in this field from the point of fundamental study to extensive application in mind (as sensors, nonvolatile memory devices, logic elements etc).

Work done in collaboration with Drs. Meservey and Tedrow, PhD students, postdoctorals, as well as high school students and undergraduates. NSF, ONR, DARPA and KIST-MIT project funds supported the research over the years.

[1] “*Spin Polarized Electron Tunneling*”, R. Meservey and P. M. Tedrow, Phys. Rep. **238**, 173 (1994)

[2] “*Frontiers in Spin Polarized Tunneling*”, J. S. Moodera, G-X. Miao and T. S. Santos, Physics Today p46 (April 2010)