

Dr. Jagadeesh S. Moodera received his Ph.D in Physics from Indian Institute of Technology (Madras). He joined MIT in 1981 as a research staff at the Francis Bitter National Magnet Laboratory (FBML), where he currently leads the **Thin Film Magnetism, Superconductivity and Nanospintronics** group. He is a visiting professor at Technological Univ. of Eindhoven (The Netherlands), an adjunct professor at Suffolk University, Distinguished Foreign Scientist at National Physical Laboratory (India) and a Distinguished Professor at IIT (Chennai, India). Dr. Moodera is a Fellow of American Physical Society and has received several national and international awards including Oliver Buckley Prize in Condensed Matter Physics from APS (2009).

Dr. Moodera's many years of research in the area of spin polarized tunneling led to the breakthrough in observing tunnel magnetoresistance (TMR) at room temperature in magnetic tunnel junctions (1995). This resulted in a huge surge in this area of research, currently one of the most active areas. TMR effect is used in all ultra-high density magnetic data storage since about 2004, as well as for the development of non-volatile magnetic random access memory (MRAM).

Research Interest:

Experimental condensed matter physics - fundamental and applied research that includes nanospintronics, spin polarized transport and tunneling, thin film magnetism, superconductivity and topological insulators.

Current research topics:

- Spin filter tunneling and internal exchange field effects.
- Topological insulators **と** Growth of ultra thin films and spin transport studies (collab. with Profs. P. Jarillo-Herrero and N. Getty).
- In search of Majorana Fermions (Collab with Prof. P. Lee).
- Organic spintronics.

- Spin filtering and transport into graphene (collab with CNRS/Thales/U of Paris, France and EPFL, Switzerland).
- Spin filtering phenomenon in oxides (collab. with CEA, Saclay, France).
- Spin polarized transport/tunneling studies in nanostructures of metals and semiconductors. (Collab. with Korea Institute of Science and Technology, Seoul, Korea)

Selected Publication

- Tunneling path toward spintronics め Guo-Xing Miao, Markus Münzenberg and Jagadeesh S Moodera, Rep. Prog. Phys. 74, 036501 (2011)
- Frontiers in Spin Polarized Tunneling め J. S. Moodera, G-X. Miao and T. S. Santos, Physics Today p46 (April 2010)
- Spin Polarized Transport in Organic Semiconductors め J. S. Moodera, T. S. Santos and K. V. Raman, A Chapter in Organic Spintronics め Ed. By Z. V. Vardeny, CRC Press, Taylor and Francis Group Publishers (2010) p1-28
- All magnesium diboride Josephson junctions with MgO and native oxide barriers め M. V. Costache and J. S. Moodera, Appl. Phys. Lett. 96, 082508 (2010)
- Magnetoresistance in double SF tunnel junctions with nonmagnetic electrodes and its unconventional bias dependence め G-X. Miao, M. Müller, and J. S. Moodera, Phys. Rev. Lett. 102, 076601, (2009)
- Observation of the triplet exciton in EuS-coated single-walled nanotubes め A. D. Mohite, T.S.Santos, J.S.Moodera and B.Alpenaar, Nature Nanotech. 4, 425 (2009).
- Measuring the spin polarization in half metals by femtosecond spin excitation め G. Mueller, J. Walowski, M. Djordjevic, G.X. Miao, A. Gupta, A.V. Ramos, K. Gehrke, V. Moshnyaga, K. Samwer, J. Schmalhorst, A. Thomas, G. Reiss, J. Moodera, M. Munzenberg, *Nat. Mater.* 8, 56 (2009)

- Effect of molecular ordering on spin and charge injection in rubrene め K.V. Raman, S.M. Watson, J.H. Shim, J.A. Borchers, J. Chang and J. S. Moodera, *Phys. Rev. B* 80, 195212 (2009).
- Large spin diffusion length in an amorphous organic semiconductor め J.H. Shim, K.V. Raman, Y.J. Park, T.S. Santos, G.X. Miao, B. Satpaty and J. S. Moodera, *Phys. Rev. Lett.* 100, 226603 (2008).
- Disturbance of Tunneling Coherence by Oxygen Vacancy in Epitaxial Fe/MgO/Fe Magnetic Tunnel Junctions め G. X. Miao, Y. J. Park, J. S. Moodera, M. Seibt, G. Eilers, M. Münzenberg, *Phys. Rev. Lett.* 100, 246803 (2008)
- Infinite Magnetoresistance from the Spin Dependent Proximity Effect in Symmetry Driven bcc-Fe/V/Fe Heteroepitaxial Superconducting Spin Valves め Guo-Xing Miao, Ana V. Ramos, and Jagadeesh S. Moodera, *Phys. Rev. Lett.*, **101**, 137001 (2008).
- Determining Exchange Splitting in a Magnetic Semiconductor by Spin-Filter Tunneling め T. S. Santos, J. S. Moodera, K.V. Raman, E. Negusse, J. Holroyd, J. Dvorak, M. Liberati, Y. U. Idzerda, and E. Arenholz, *Phys. Rev. Lett.*, 101, 147201 (2008).
- The phenomena of spin filter tunneling め J. S. Moodera, Tiffany S. Santos and Taro Nagahama, *J. Phys.: Condens. Matter* 19, 165202 (2007) ま A review
- Room temperature tunnel magnetoresistance and spin polarized tunneling studies with organic semiconductor barrier め T. S. Santos, J. S. Lee, P. Migdal, I. C. Lekshmi, B. Satpati, and J. S. Moodera, *Phys. Rev. Lett.* 98, 016601(2007)

- Influence of Spin-Polarized Current on Superconductivity and the Realization of Large Magnetoresistance め G.-X Miao, K. S Yoon, T. S. Santos, and J. S. Moodera, *Phys. Rev. Lett.*, 98, 267001 (2007)
- Carrier-controlled ferromagnetism in transparent oxide semiconductors め J. Philip, A. Punnoose, B. I. Kim, K. M. Reddy, S. Layne, J. O. Holmes, B. Satpati, P. R. LeClair, T. S. Santos and J. S. Moodera, *Nature Mater.* v 5, 298-304 (2006).
- Co-existence of ferromagnetism and superconductivity in a 3d ferromagnet め P. LeClair, J.S. Moodera, J. Philip, and D. Heiman, *Phys. Rev. Lett.* 94, 037006 (2005)
- Spin Polarized Tunneling め ま A chapter by J. S. Moodera and R. Meservey, in め Magnetoelectronics め Edited by M. Johnson (Elsevier Academic Press 2004)
- Superconductor-Ferromagnet tunneling measurements indicate sp and d spin currents め M. Muenzenberg and J. S. Moodera, *Phys. Rev.B Rapid Commun.* 70, 060402(R) (2004).
- Demonstration of all in-situ magnesium diboride superconductor thin film tunnel junctions め T. H. Kim and J. S. Moodera, *Appl. Phys. Lett.* 85, 434 (2004).
- Observation of Quantum Well States in Spin Dependent Tunnel Junctions め J. S. Moodera, J. Nowak, L.R. Kinder, P.M. Tedrow, R.J.M. van de Veerdonk, B. A. Smits, M. van Kampen, H. J. M. Swagten and W. J. M. de Jonge, *Phys. Rev. Lett.*, 83, 3029 (1999).
- Spin tunneling in ferromagnetic junctions め J. S. Moodera, J. Nassar and G. Mathon, *Annu. Rev. Mater. Sci.*, 29, 381-432 (1999).
- Interface Magnetism and Spin Wave Scattering in Ferromagnet- Insulator-Ferromagnet Tunnel Junctions め Jagadeesh S. Moodera, Janusz Nowak, and Rene J. M. Van de Veerdonk, *Phys.Rev. Lett.* 80, 2941 (1998)

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