

Mandar M. Deshmukh

Department of Condensed Matter Physics and Materials Science
Tata Institute of Fundamental Research, deshmukh@tifr.res.in
Homi Bhabha Road, Mumbai, 400 005 www.tifr.res.in/~deshmukh

Date of Birth 20th October 1974

Citizenship Indian

Current position:

January 2006 - Faculty member
(Fellow E; Reader F)
Department of Condensed Matter Physics
and Materials Science (DCMP and MS),
Tata Institute of Fundamental Research
(TIFR), Mumbai, India 400005

Education:

August 1996-July 2002 Cornell University, Ithaca NY
*“Probing Magnetism at the Nanometer
Scale Using Tunneling Spectroscopy”*
Advisor: Prof. D.C. Ralph
Ph.D., Physics, August 2002
M.S., Physics, July 1999

July 1992- April 1996 Indian Institute of Technology, Bombay, India.
B.Tech Engineering Physics

Research:

Jan 2006- Principal investigator of an independent research
group
Emphasis on nanometer scale physics and
nanoelectronics

**October 2002- Dec2005 Postdoctoral work, Harvard University
Cambridge MA.**
Postdoctoral fellow in the group of Prof. Hongkun
Park.

Molecular electronics
Spin polarized transport across single molecule
transistors.

Mesoscopic superconductivity

Observed signatures of a single vortex induced rearrangement of vortex lattice in superconducting nanowires.

June 1996-July 2002

LASSP, Cornell University, Ithaca NY.

Worked under the supervision of Prof. D.C. Ralph in the area of experimental nanoscale physics.

Spin polarized tunneling via discrete quantum states

Probed spin polarized tunneling via discrete particle-in-a-box states.

Tunneling spectroscopy of individual metal nanoparticle.

Measured tunneling spectrum of nanometer scale magnets, studying the role of non-equilibrium excitations and magnetic anisotropy. Also investigated the role of electron-electron interactions in non-magnetic single electron transistors.

Teaching:

TIFR, Mumbai

Basic electronics course for first year graduate students Electronics (2009,2010)

Solid State Physics (2011,2012)

Physics Department, Cornell University, Ithaca, NY.

Teaching Assistant for introductory physics courses, which involved leading recitation sessions and evaluating student performance.

Honours:

B.M. Birla science prize in Physics for the year 2010

Community service:

Reviewer for Nature Nanotechnology, Physical Review Letters, Physical Review B, Applied Physics Letters, Journal of Applied Physics, Nano Letters and Journal of Vacuum Science and Technology B

Publications since leading an independent research group:

1. *High-Q electromechanics with InAs nanowire quantum dots*
Hari S. Solanki, Shamashis Sengupta, Sudipta Dubey, Vibhor Singh, Sajal Dhara, Anil Kumar, Arnab Bhattacharya, S. Ramakrishnan, Aashish A. Clerk and **Mandar M. Deshmukh**
Appl. Phys. Lett. **99**, 213104 (2011).
2. *Dual top gated graphene transistor in the quantum Hall regime*
Ajay K Bhat , Vibhor Singh , Sunil Patil and **Mandar M. Deshmukh**
Solid State Communications **152**, 545-548 (2012).
3. *Field-effect modulation of conductance in VO₂ nanobeam transistors with HfO₂ as the gate dielectric*
Shamashis Sengupta, Kevin Wang, Kai Liu, Ajay K. Bhat, Sajal Dhara, Junqiao Wu, **Mandar M. Deshmukh**
App. Phys. Lett. **99**, 062114 (2011).
4. *Facile fabrication of lateral nanowire wrap-gate devices with improved performance*
Sajal Dhara, Shamashis Sengupta, Hari S. Solanki, Arvind Maurya, Arvind Pawan R., M. R. Gokhale, Arnab Bhattacharya, and **Mandar M. Deshmukh**
Appl. Phys. Lett. **99**, 173101 (2011). (**COVER ARTICLE**)
5. *Ultralow and tunable thermal conductivity in defect engineered nanowires at low temperatures*
Sajal Dhara, Hari S. Solanki, Arvind Pawan R., Vibhor Singh, Shamashis Sengupta, B.A. Chalke, Abhishek Dhar, Mahesh Gokhale, Arnab Bhattacharya, and **Mandar M. Deshmukh**
Phys. Rev. B **84**, 121307 (2011).
6. *Nanoscale electromechanical resonators as probes of the charge density wave transition in NbSe₂*
Shamashis Sengupta, Hari S. Solanki, Vibhor Singh, Sajal Dhara and **Mandar M. Deshmukh**
Physical Review B **82**, 155432 (2010).

7. *Probing thermal expansion of graphene and modal dispersion at low temperature using graphene NEMS resonators*
Vibhor Singh, Shamashis Sengupta, Hari S. Solanki, Rohan Dhall, Adrien Allain, Sajal Dhara, Prita Pant and **Mandar M. Deshmukh**
Nanotechnology **21**, 165204 (2010).
8. *Tuning mechanical modes and influence of charge screening in nanowire resonators*
Hari S. Solanki, Shamashis Sengupta, Sajal Dhara, Vibhor Singh, Sunil Patil, Rohan Dhall, Jeevak Parpia, Arnab Bhattacharya, and **Mandar M. Deshmukh**
Physical Review B, **81**, 115459 (2010).
9. *Non-equilibrium breakdown of quantum-Hall state in graphene*
Vibhor Singh and **Mandar M. Deshmukh**
Physical Review B, **80**, 081404R (2009).
10. *Magnetotransport properties of individual InAs nanowires*
Sajal Dhara, Hari S. Solanki, Vibhor Singh, Arjun Narayanan, Prajakta Chaudhari, Mahesh Gokhale, Arnab Bhattacharya, and **Mandar M. Deshmukh**
Physical Review B, **79**, 121311R (2009).