

R. Sooryakumar

Professional Preparation

University of Sri Lanka, Colombo, Sri Lanka	Physics	B.S. (first class)	1973
University of Illinois Champaign-Urbana	Physics	M.S.	1976
University of Illinois Champaign-Urbana	Physics	Ph.D.	1980

Appointments

1995 - Present	Professor of Physics, The Ohio State University
1989 - 1995	Associate Professor of Physics, The Ohio State University
1984 - 1989	Assistant Professor of Physics, The Ohio State University
1983 - 1984	Quantum Electronics Research Department, AT&T Bell Laboratories, Holmdel New Jersey
1981 - 1983	Alexander von Humboldt Fellow, Max Planck Institute for Solid State Physics, Stuttgart, Germany.

Awards: Winner, 1980 Sigma Xi award for best research paper by a graduate student at the University of Illinois (Champaign Urbana).

Alexander von Humboldt Fellow Germany, 1981-1983.

Current Research Interests: a) Optical Spectroscopy in condensed matter systems
b) Micro- and nano-scale transport and assembly
c) Biophysics – cell manipulation, biomechanics

Selected peer-reviewed publications (out of 90 publications)

1. T. Henighan, A. Chen, G. Vieira, A.J. Hauser, F.Y. Yang, J.J. Chalmers, **R. Sooryakumar**, "Manipulation of magnetically labeled and unlabeled cells with mobile magnetic traps", Biophysical Journal 98, (2010) to appear.
2. S. T. Bailey, M. Twa, J. C. Gump, M. Venkiteshwar, M. Bullimore, **R. Sooryakumar**, "Light scattering study of the normal human eye lens: Elastic properties and age dependence", submitted IEEE Transactions on Biomedical Engineering (2010)
3. G. Vieira, T. Henighan, A. Chen, A.J. Hauser, F.Y. Yang, J.J. Chalmers, **R. Sooryakumar**, "Magnetic wire traps and programmable manipulation of biological cells", Physical Review Letters 103, 128101 (2009).
4. W. Zhou, R.P. Tiwari, R. Annamalai, **R. Sooryakumar**, V. Subramanian, D. Stroud, "Sound propagation in light-modulated carbon nanosponge suspensions", Physical Review B79, 104204 (2009).
5. W.C. Liu, G. Hoffman, W. Zhou, R. Reano, P. Boolchand and **R. Sooryakumar**, "Slab optical waveguides and nanoscale patterning of pulsed laser deposited Ge_{0.2}Se_{0.8} chalcogenide films", Applied Physics Letters **93**, 041107 (2008).
6. G. B. Hoffman, W.-C. Liu, W. Zhou, **R. Sooryakumar**, P. Boolchand, R. M. Reano, "Relief and trench formation on chalcogenide thin-films using electron beams", Journal of Vacuum Science and Technology (B) **26**, 2478 (2008).
7. W.C. Liu, G. Hoffman, W. Zhou, R. M Reano, P. Boolchand and **R. Sooryakumar**, "Slab waveguides and nanoscale patterning of pulsed laser-deposited Ge_{0.2}Se_{0.8} chalcogenide films", Appl. Phys. Lett. **93**, 041107 (2008).
8. X. Xie, X.W. Zhao, J.W. Knepper, F.Y. Yang and **R. Sooryakumar**, "Temperature dependence of interlayer exchange coupling in Co/Pt multilayers observed by magneto optical Kerr imaging", Physical Review B. **76**, 184433 (2007).

Patents:

R. Sooryakumar, G. Vieira, D. Sooryakumar, **Mobile magnetic traps and platforms for micro/ nanoparticle manipulation**, PCT application filed 5/22/09.

R. Sooryakumar, J.Chalmers, T. Henighan, and G. Vieira **Magnetic platform for biomolecule trapping, manipulation and sorting**, Provisional Patent US 61/150,363 filed on 2/6/09, PCT application to be filed prior to 2/6/10.

Press Coverage of Research:

From September 7, 2004: (Reversible Photo-tuning of the Elasticity of Network Glasses)
<http://www.physorg.com/news1081.html>

From March 16, 2009 (Measuring flexibility of human eye lenses as we age):
<http://www.aps.org/meetings/march/vpr/2009/pressreleases/biomedical.cfm>

From June 2009 (Exploring age related far-sightedness):
www.opnmagazine-digital.com/opn/200906?pg=8

From September 21, 2009: (Joystick Manipulation of Cells)
<http://www.foxnews.com/scitech/2009/09/21/game-scientists-cells-joystick/>

Synergetic Activities

Strong proponent for participation of undergraduates in research and sponsored over a dozen undergraduate researchers over the past ten years at Ohio State. Many utilized this experience to submit, and successfully defend, Honors thesis reports. Several have moved onto graduate studies in Physics at prestigious universities (examples include Harvard (Ilya Finkler), Cambridge (UK) (Garth Robins), University of Illinois, Urbana (Kevin O'Donovan) and many won national awards (Goldwater, Marshal, Fulbright, NSF graduate fellowships). Others have taken on industrial positions. In several instances undergraduates have been co-authors on refereed publications, including Physical Review Letters and Biophysical Journal. Undergraduates are often supported by NSF REU or other sponsored research funds with their research including collaboration with industry and faculty in other colleges. Outreach efforts include mentoring high school students with science fair projects as well as sponsoring others for summer research. Funded collaborative studies with high technology companies (e.g. Intel) target product development as well as research with partners at National Labs.

Together with researchers in the Department of Optometry at Ohio State University and University of Houston we are developing techniques to measure the elastic properties of the human cornea and lens. These properties are relevant to the etiology, detection, and management of many ocular diseases. Anisotropic materials such as the cornea can only be adequately characterized by measuring multiple elastic constants that separately describe transverse, longitudinal, and shear responses to stress. We are developing *laser scattering* methods which are non-invasive to measure the elastic properties of these tissues. Our long term goal is to develop this technique as a research tool to measure the physiological parameters of ocular tissues under controlled laboratory conditions, and ultimately as a clinical tool to measure physical properties *in vivo*.

Students Advised: 2 postdoctoral, 13 Ph.D, 15 M.S., and 5 B.S. Honors Thesis.

Thesis Advisor and Postgraduate-Sponsor:

Ph.D Advisor: Prof. Miles V. Klein; Post doctoral Mentor: Prof. Manuel Cardona.