

Rizia Bardhan

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 Chemical and Biomolecular Engineering Department
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Academic Appointments

2012 – present Assistant Professor
 Department of Chemical and Biomolecular Engineering
 Vanderbilt University

2010 – 2012 Postdoctoral Fellow
 The Molecular Foundry
 Lawrence Berkeley National Laboratory

Education

2005 – 2010 Ph. D., Chemistry, Rice University, Houston, TX

2001 – 2005 B. A., Mathematics and Chemistry, Westminster College, Fulton, MO

Research Interests

Plasmonic and nanophotonics; energy production and energy storage; biomedicine, biosensing and biomimetics; nanofabrication and colloidal synthesis; optical spectroscopy

Awards and Honors

2011 Forbes Magazine, “Top 30 under 30” Rising Stars of Science and Innovation Award

2010 Rice University Norman Hackerman Research Excellence Award

2009 Rice University Edgar O’Rear Research Travel Award

2009 Rice University Harry B. Weiser Research Excellence Award

2007 Rice University Chemistry Graduate Student Association Research Award

2005 Rice University Robert A. Welch Pre-doctoral Fellowship

2004 Westminster College F. Brooke Sloss Memorial Mathematics Honors Award

2003 Westminster College Pi Mu Epsilon Mathematics Honors Award

Students Mentored

2010 – 2012 *Lawrence Berkeley National Lab, Berkeley, CA*
 Anna Bezryadina (Physics Graduate Student, UC Santa Cruz)
 Norman Su (Chemical engineering Graduate Student, UC Berkeley)

2007 – 2010 *Rice University*
 Stephen Levit (Chemistry REU Student, LaSalle University)
 Shaunak Mukherjee (Chemistry Graduate Student, Rice University)
 Christyn A. Thibodeaux (Physics REU Student, Xavier University of Louisiana)
 Lisa Brown (Chemistry Graduate Student, Rice University)

Patents

R. Bardhan, A. Joshi, N. J. Halas, "Nanoshells engineered for targeted, simultaneous enhancement of magnetic and optical imaging and photothermal therapeutic response", US patent 2011/0158915 A1

Publications

28. **R. Bardhan**, L. O. Hedges, C. L. Pint, A. Javey, S. Whitelam, J. J. Urban, "Uncovering the intrinsic size dependence of hydriding phase transformations in nanocrystals" *Nature Materials*, under review.

27. A. M. Ruminski, **R. Bardhan**, A. Brand, J. J. Urban, "Polymer nanocomposites: A route to air-stable hydrogen storage media" *Energy and Environmental Science*, submitted.

26. A. M. Ruminski, **R. Bardhan**, A. Brand, J. J. Urban, "Tuning the kinetics and thermodynamics of hydrogen storage in Ni and Ti doped Mg nanocomposites", in preparation.

25. **R. Bardhan**, A. M. Ruminski, A. Brand, J. J. Urban, "Magnesium Nanocrystal-Polymer Composites: A New Platform for Designer Hydrogen Storage Materials", *Energy and Environmental Science*, 2011, 4, 4882-4895.

24. **R. Bardhan**, S. Lal, A. Joshi, N. J. Halas, "Theranostic Nanoshells: from Probe Design to Imaging and Treatment of Cancer", *Accounts of Chem. Research*, 2011, 44 (10), 936–946.

23. C. L. Pint, K. Takei, R. Kapadia, M. Zheng, J. Moon, A.C. Ford, J. Zhang, A. Jamshidi, **R. Bardhan**, J. J. Urban, M. Wu, J. W. Ager, M. Oye, A. Javey, "Rationally designed three-dimensional carbon nanotube back contacts for efficient solar devices" *Advanced Energy Materials*, 2011, 1, 1040–1045.

22. A. M. Ruminski, **R. Bardhan**, A. Brand, J.J. Urban, "Future prospects for hydrogen storage in designer nanocomposites" *Biofuels*, 2011, 2, 591-594.

21. X. Zhang, C.L. Pint, M.H. Lee, B.E. Schubert, A. Jamshidi, K. Takei, H. Ko, A. Gillies, **R. Bardhan**, J.J. Urban, M. Wu, R. Fearing, and A. Javey, "Optically- and thermally-responsive programmable materials based on carbon nanotube-hydrogel polymer composites" *Nano Letters*, 2011, 11, 3239–3244. (Highlighted in *Nature*, 2011, 475, 426)

20. K. J. Jeon, H. R. Moon, A. M. Ruminski, B. Jiang, C. Kisielowski, **R. Bardhan** and J. J. Urban, "Metallic Magnesium Nanocomposites Provide Rapid and High-Capacity Hydrogen Storage Without Heavy-Metal Catalysts" *Nature Materials*, 2011, 10, 286-290. (Highlighted in *BBC News*)

19. A. Fan, C. Wu, K. Bao, J. Bao, **R. Bardhan**, N. J. Halas, V. N. Manoharan, P. Nordlander, G. Shvets, F. Capasso, "Self-Assembled Plasmonic Nanoparticle Clusters" *Science*, 2010, 328, 1135-1138.
18. **R. Bardhan**, W. Chen, M. Bartels, C. Perez-Torres, M. F. Botero, R. W. McAninch, A. Contreras, R. Schiff, R. G. Pautler, N. J. Halas, A. Joshi, "Tracking of Multimodal Therapeutic Nanocomplexes Targeting Breast Cancer *in vivo*" *Nano Letters*, 2010, 10 (12), 4920-4928.
17. **R. Bardhan**, N. K. Grady, T. Ali, N. J. Halas, "Metallic Nanoshells with Semiconductor Cores: Optical Characteristics Modified by Core Medium Properties" *ACS Nano*, 2010, 4 (10), 6169-6179.
16. J. A. Fan, K. Bao, C. Wu, J. Bao, **R. Bardhan**, N. J. Halas, V. N. Manoharan, G. Shvets, P. Nordlander, F. Capasso, "Fano-Like Interference in Self-Assembled Plasmonic Quadrumer Clusters" *Nano Letters*, 2010, 10 (11), 4680-4685.
15. S. Mukherjee, H. Sobhani, J. B. Lassitter, **R. Bardhan**, P. Nordlander, N. J. Halas, "Fanoshells: Nanoparticles with Built-in Fano Resonances" *Nano Letters*, 2010, 10 (7), 2694-2701.
14. W. Chen*, **R. Bardhan***, M. Bartels, C. Perez-Torres, R. G. Pautler, N. J. Halas, A. Joshi, "A Molecularly Targeted Theranostic Probe for Ovarian Cancer" *Molecular Cancer Therapeutics*, 2010, 9, 1028-1038 (*equal contribution).
13. N. K. Grady, M. W. Knight, **R. Bardhan**, N. J. Halas, "Optically-Driven Collapse of a Plasmonic Nanogap Self-monitored by Optical Frequency Mixing" *Nano Letters*, 2010, 1522-1528.
12. **R. Bardhan**, S. Mukherjee, N. A. Mirin, S. D. Levit, P. Nordlander, N. J. Halas, "Nanosphere-in-a-Nanoshell: the Simplest Nanomatryushka" *Journal of Physical Chemistry C*, 2010, 114 (16), 7378-7383.
11. **R. Bardhan**, W. Chen, C. Perez-Torres, M. Bartels, R. M. Huschka, L. Zhao, E. Morosan, R. G. Pautler, A. Joshi and N. J. Halas, "Nanoshells Engineered for Targeted, Simultaneous Enhancement of Magnetic and Optical Imaging and Photothermal Therapeutic Response" *Advanced Functional Materials*, 2009, 19(24) 3901-3909.
(Highlighted in *Physics Today*, *Small Times* and *Popular Science*)
10. A. Barhoumi, R. M. Huschka, **R. Bardhan**, M. W. Knight, and N. J. Halas, "Characteristics of Light-controlled Release of ssDNA from Plasmonic Nanoparticle Vectors" *Chemical Physics Letters*, 2009, 482, 171-179. (Cover October 2009)
9. **R. Bardhan**, N. Grady, J. R. Cole, A. Joshi, and N. J. Halas, "Fluorescence Enhancement by Au Nanostructures: Nanoshells and Nanorods" *ACS Nano*, 2009, 3 (3), 744-752.
8. **R. Bardhan**, O. Neumann, N. Mirin, H. Wang and N. J. Halas, "Au Nanorice Assemble Electrolytically into Mesostars" *ACS Nano*, 2009, 3, 266-272. (Cover February 2009)

7. M. Bartels, W. Chen, **R. Bardhan**, S. Ke, N. J. Halas, T. Wareing, J. Mc Ghee, and A. Joshi, "Multimodal Optical Molecular Image Reconstruction with Frequency Domain Measurements" **Proceedings IEEE EMBC**, 2009, 6655-6658.
6. **R. Bardhan**, N. Grady and N. J. Halas, "Nanoscale control of Near-Infrared Fluorescence Enhancement using Au Nanoshells" *Small*, 2008, 4, 1716-1722.
5. B. E. Brinson, J. B. Lassiter, C. S. Levin, **R. Bardhan**, N. Mirin, N. J. Halas, " Nanoshells Made Easy: Improving Au Layer Growth on Nanoparticle Surfaces" *Langmuir*, 2008, 24, 14166-14177.
4. M-R. Choi, K. J. Stanton-Maxey, C. S. Levin, **R. Bardhan**, D. Akin, J. Sturgis, J. Paul Robinson, R. Bashir, N. J. Halas and S. E. Clare, "A Cellular Trojan Horse for Delivery of Therapeutic Nanoparticles in Tumors" *Nano Letters*, 2007, 7(12), 3759-3765.
3. **R. Bardhan**, H. Wang, F. Tam, and N. J. Halas, "Facile Chemical Approach to ZnO Submicrometer Particles with Controllable Morphologies" *Langmuir*, 2007, 23, 5843-5847.
2. M. W. Knight, N. R. Grady, **R. Bardhan**, F. Hao, P. Norlander, N. J. Halas, "Polarization-Dependent Conversion of Light into Nanowire Plasmons by Adjacent Nanoparticles" *Nano Letters*, 2007, 7(8), 2346 – 2350
1. C. S. Levin, B. G. Janesko, **R. Bardhan**, G. E. Scuseria, J. D. Hartgerink, N. J. Halas, " Chain Length Dependent Vibrational Resonances in Alkanethiol Self-Assembled Monolayers Observed on Plasmonic Nanoparticle Substrates", *Nano Letters*, 2006, 6(11), 2617 – 2621.

Invited Talks

***In situ* Optical Sensing with Plasmonic Nanostructures**

University of Texas Austin, Chemical Engineering Department, March 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

University of Illinois-Urbana Champaign, Chemical Engineering Department, March 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Vanderbilt University, Chemical Engineering Department, February 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Rensselaer Polytechnic Institute, Chemical Engineering Department, February 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Johns Hopkins University, Chemical Engineering Department, February 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Rutgers University, Chemical Engineering Department, February 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Iowa State University, Material Science and Chemical Engineering Department, February 2012

***In situ* Optical Sensing with Plasmonic Nanostructures**

Virginia Tech, Biomedical Engineering Department, February 2012

Manipulating Light at the Nanoscale: From Sensing to Energy Storage

University of Connecticut, Chemistry Department, January 2012

Manipulating Light at the Nanoscale: From Sensing to Energy Storage

SUNY Stony Brook, Chemistry Department, December 2011

Manipulating Light at the Nanoscale: From Sensing to Energy Storage

Wake Forest University, Chemistry Department, November 2011

Combining Multiple Functions in Single Optically Responsive Nanoparticles for Theranostics

Materials Research Society (MRS) National Meeting, San Francisco, CA, April 2010.

Nanoscale Biomedical Plasmonics

MRS National Meeting, Boston, MA, 2009.

Conference Talks

Uncovering the intrinsic size dependence of hydriding phase transformations in nanocrystals MRS National Meeting, San Francisco, CA, April 2012.

Size-dependent critical nuclei formation energies of nanocrystal-gas equilibria MRS National Meeting, San Francisco, CA, April 2011.

Nanoshells engineered for targeted imaging and photothermal therapeutic response MRS National Meeting, Boston, MA, 2009.

Near-Infrared Fluorescence Enhancement via Gold Nanoshells and Biomedical Applications Rice Quantum Institute (RQI) Summer Research Colloquium, Houston, TX, 2008.

Nanoscale Control of Near-Infrared Fluorescence Enhancement via Gold Nanoshells Gordon Research Conference, Tilton, NH, 2008.

Distance Dependent Fluorescence Enhancement of Indocyanine Green via Au Nanoshells MRS National Meeting, Boston, MA, 2007.

Professional Activities

Journal Reviewer: Nano Letters, ACS Nano, Journal of Physical Chemistry, Optics Express, Optics Letters, Journal of American Chemical Society.

Professional Memberships

2005 – present American Chemical Society

2005 – present Materials Research Society

2012 – present American Institute of Chemical Engineers