

RAJESH SHARMA

Assistant Professor of Renewable Energy Technology
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Education

Ph.D.	Engineering Science and Systems	University of Arkansas at Little Rock, AR	2004
M.S.	Materials Science & Engineering	University of Florida, Gainesville, FL,	1999

Academic appointments

Assistant Professor of Renewable Energy Technology, Arkansas State University, Jonesboro, AR, 06/ 2009 – current.

Research Assistant Professor, Graduate Institute of Technology, University of Arkansas at Little Rock, 08/2006 – 06/2009.

Post-doctoral Research associate, Department of Applied Science, University of Arkansas at Little Rock, 08/2004 – 08/2006.

Other appointments

Affiliate Scientist, University of Arkansas at Little Rock Nanotechnology Center

Graduate Faculty, University of Arkansas at Little Rock

Instructional experience

- Trained in various learning management systems and distance learning technologies
- Completed online instruction training by Interactive Teaching & Technology Center at the Arkansas State University

Curricula development

Developed and taught following cross-disciplinary courses

- Fundamentals and Application of Renewable Energy
- Advanced Renewable Energy Systems
- Energy Conservation and Efficiency
- Plasma Engineering (Graduate Course)
- Energy Analysis (Graduate Course)
- Materials Challenges in Renewable Energy (Graduate Course)

Research Experience

Renewable Energy and Nanotechnology

- Photo electrochemical hydrogen production.
- Electrochemical synthesis, fabrication, integration and characterization of nanostructured photo anodes.
- Development of Perovskite-phase ceramic membranes for high temperature oxygen ion transport for fuel cell applications.
- Synthesis and characterization of supported Au and Pd Catalysts.
- Development of advanced catalyst systems for CO remediation using plasma surface modification.

Surface Engineering

- Designing and development of a fluidized bed atmospheric-pressure plasma reactor for surface modification of materials. This novel plasma reactor was used for modifying surface properties of sheet like substrates as well as particulate materials.
- Characterization of plasma-modified surfaces using various analytical techniques such as AFM, SEM, XPS, IR and Contact angle measurement.

Biomedical and other applied research

- Development of biocompatible cardiovascular stents

- Worked on a NASA sponsored research for development of an electrodynamic screen to remove dust particles from solar cells and astronaut suits on Mars and Moon surface.
- Characterization of electrostatic properties of Mars simulant dust.

Honors and awards

- Elected Senior member of IEEE, 2011
- James Melcher award by IEEE for outstanding paper, 2009 and 2010
- Elected Vice-president, Secretary, and Adjunct Secretary of IEEE-Industry Applications Society Electrostatic Processes Committee, 2011-2013, 2009-2011, and 2007-2009 respectively.
- Travel award to attend IEEE-IAS annual conference in Hong Kong, Office of Research and Sponsored Program, University of Arkansas at Little Rock, 2005.
- Outstanding PhD Student, Donaghey College of Information Science and Systems Engineering, University of Arkansas at Little Rock, 2003.
- M. K. Testerman award for excellence in research, University of Arkansas at Little Rock, 2001.
- Outstanding first year graduate student, University of Arkansas at Little Rock, 2000.
- Outstanding achievement award, University of Florida, Gainesville, FL, 1998.

Synergistic activities

- Associate Editor, IEEE Transactions on Industry Applications (2007-present)
- Associate Editor, International Journal of Renewable Energy Technology (2009-present)
- Organized “2011 Annual Renewable Energy conference,” Arkansas State University, Jonesboro, AR, April 18, 2011
- Organized the conference “Renewable Energy in Arkansas: Opportunities for Economic Development,” Arkansas State University, Jonesboro, AR, April 19, 2010
- Member, Technical Committee, Joint conference on Electrostatics, Boston, MA, June 16-18, 2009
- Organizer First IEEE/IAS/EPC-ESA joint meeting at Little Rock, 2003.
- Session chair, Session: “Nano- and Micro- Electrostatic Processes” IEEE-IAS (Institute of Electrical and Electronics Engineers – Industry Applications Society) Annual Meeting, Orlando, FL October 9-13, 2011.
- Invited to Co-Chair the session “Advances in Photovoltaic as an Energy Source” at the 2007 AIChE (American Institute of Chemical Engineers) Spring National Meeting in Houston, April 22-26, 2007.
- Session Chair, “Corona and Plasma Discharge reactors” at the IEEE-IAS Annual Meeting, Hong Kong, October 2005.
- Session organizer, Session: “Nano- and Micro- Electrostatic Processes” IEEE-IAS (Institute of Electrical and Electronics Engineers – Industry Applications Society) Annual Meeting, Houston, TX October 4-6, 2010.
- Session organizer, Session: “Material Properties and Measurement Techniques” IEEE-IAS Annual Meeting, Edmonton, Canada October 5-9, 2008.
- Session organizer, Session: “Electrical Discharges” at the IEEE-IAS Annual Meeting, New Orleans, September 23-26, 2007.
- Paper Review Manager, Session: “Charge Control” at the ESA/IEEE-IAS/IEJ/SFE Joint Conference on Electrostatics, University of California, Berkeley, CA June 2006
- Reviewer, NASA Postdoctoral Program, 2009
- Reviewer, Open Technology Program (OTP) of The Technology Foundation STW, Dutch funding agency for Academic Research, 2009
- Reviewer, A Handbook of Renewable Energy Technology, World Scientific Publishing Company, Singapore, 2009
- Served as Paper reviewer for the following journals
 - Journal of Aerospace Engineering
 - Journal of Solid State Electrochemistry
 - IEEE Transactions on Industry Applications - Energy Systems Committee
 - IEEE Transactions on Industry Applications - Electrostatic Processes Committee
 - International Journal of Renewable Energy Technology

- Electrochemical and Solid State Letters
- Particulate Science and Technology: An International Journal
- Journal of Adhesion Science and Technology,”
- Nanotechnology
- Physics Letters A
- Journal of Physics D: Applied Physics
- Applied Surface Science
- Surface and Coatings Technology

Committee Service:

- University Education and Technology Committee, Arkansas State University, 2010- 2011
- Self-assessment committee, College of Agriculture and Technology, Arkansas State University, 2010-2011
- Undergraduate Curriculum and Policies Committee, College of Agriculture and Technology, Arkansas State University, 2010-2011
- Prior Learning Assessment committee, College of Agriculture and Technology, Arkansas State University, 2009- 2010, Co-Chair, 2010 - 2011
- Careers Committee, College of Agriculture and Technology, Arkansas State University, 2009- 2010

Patent, Publications and Presentations

Patent

“Encased stent” Mark M. Mazumder, Jawahar L. Mehta, Malay K. Mazumder, Nawab Ali, Steven Trigwell, **Rajesh Sharma** and Samiran De, U.S. Patent 7,311,727 B2, 2007.

Book Chapters

1. M. K. Mazumder, **R. Sharma**, A. S. Biris, M. N. Horenstein, J. Zhang, H. Ishihara, J. W. Starks, S. Blumenthal and O. Sadler, “Electrostatic Removal of Particles and its applications to Self-Cleaning Solar Panels and Solar Concentrators,” in Developments in Surface Contamination and Cleaning: Methods for Removal of Particle Contaminants, Volume 3, pp.149-200, chapter 5, Elsevier, 2011, ISBN: 978-1-4377-7885-4
2. M. K. Mazumder, A. S. Biris, C. E. Johnson, C. Y. Yurteri, R. A. Sims, **R. Sharma**, K. Pruessner, S. Trigwell and J. S. Clements, “Solar panel obscuration by dust and dust mitigation in the Martian atmosphere,” in Particles on Surfaces 9: Detection, Adhesion And Removal, Brill, 2006, pp.1-29. ISBN 90 6764 435 8.
3. **R. Sharma**, S. Trigwell, M. K. Mazumder, and R. A. Sims, “Modification of Electrostatic Properties of Polymer powders using Atmospheric Plasma Reactor,” in Polymer Surface Modification: Relevance to Adhesion, Volume 3 , 2004; VSP, AH Zeist, The Netherlands, pp. 25-37. ISBN 90-6764-403-X.
4. H. El-Shall, S. A. Svoronos, N. A. Abdel-Khalek, S. Gupta, and **R. Sharma**, “Evaluations of Spargers for Column Flotation of Phosphates,” in Development on non-renewable resources: challenges and solutions, 1999; United Engineering Foundation, New York, pp. 51-65. ISBN 0939204576.

Selected Publications

1. **Rajesh Sharma**, A. S. Biris, and M. K. Mazumder, “Plasma surface modification of TiO₂ nanoparticles for Dye-Sensitized Solar Cell (DSSC) application,” *IEEE Industry Applications Society 44th Annual Meeting*, Orlando, FL 2011.
2. Franklin D. Hardcastle, Hidetaka Ishihara, **Rajesh Sharma** and Alexandru S. Biris, “Photoelectroactivity and Raman spectroscopy of anodized titania (TiO₂) photoactive water-splitting catalysts as a function of oxygen-annealing temperature,” *J. Mater. Chem.*, 2011, 21, 6337
3. **Rajesh Sharma**, Hidetaka Ishihara, Alexandru S. Biris, Malay K. Mazumder, “Development of surface engineered nanostructured photoanodes for enhanced photo electrochemical processes,” *IEEE Industry Applications Society 43rd Annual Meeting*, Houston, 2010.
4. Hidetaka Ishihara, Jacob P Bock, **Rajesh Sharma**, Franklin Hardcastle, Ganesh K Kannarpady, Malay K Mazumder, “Electrochemical Synthesis of Titania Nanostructural Arrays and their Surface Modification for Enhanced Photoelectrochemical Hydrogen Production,” *Chemical Physics Letters*, Volume 489, Issues 1-3, 2010

5. **Rajesh Sharma**, Jacob P. Bock, Alexandru S. Biris, Malay K. Mazumder, Prajna P. Das, Manoranjan Misra, Vishal K. Mahajan, "Evaluation of atmospheric-pressure plasma for improving photo electrochemical response of titania photoanodes," *IEEE Transactions on Industry Applications*, Vol. 45, No. 4, pp. 1524-1529, 2009.
6. **R. Sharma**, P. P. Das, V. Mahajan, J. Bock, S. Trigwell, A. S. Biris, M. K. Mazumder, M. Misra, "Enhancement of Photoelectrochemical Conversion Efficiency of Nanotubular TiO₂ Photoanodes using Nitrogen Plasma Assisted Surface Modification," *Nanotechnology*, Vol. 20, 2009, 075704.
7. **R. Sharma**, C. Wyatt, J. Zhang, C. Calle, N. Mardisich, Malay Mazumder, "Experimental evaluation and analysis of Electrodynamic Screen as dust mitigation technology for future Mars Missions," *IEEE Transactions on Industry Applications*, vol. 45, no. 2, pp. 591-596, 2009.
8. **R. Sharma**, S. Trigwell, and M. K. Mazumder, "Interfacial Processes and Tribocharging: Effect of Plasma Surface Modification and Physisorption" *Particulate Science and Technology*, Vol. 26, Issue 6, p587-594, 2008.
9. **R. Sharma**, D. W. Clark, P. K. Srirama, M. K. Mazumder, "Contact charging of Martian Dust Simulant," *IEEE Transactions on Industry Applications* Vol. 44, Issue 1, pp. 32 – 39, 2008.
10. **Rajesh Sharma**, Edward Holcomb, Steve Trigwell and Malay Mazumder, "Stability of Atmospheric-pressure plasma induced changes on Polycarbonate surfaces," *Journal of Electrostatics*, Vol. 65, Issue 4, pp. 269-273, 2007.

Selected Presentations in Scientific Conferences and Symposium

1. **Rajesh Sharma**, "Plasma surface modification of TiO₂ nanoparticles for Dye-Sensitized Solar Cell (DSSC) application," *IEEE Industry Applications Society 44th Annual Meeting*, Orlando, FL, October 11th, 2011.
2. **Rajesh Sharma**, "Directions and Challenges in Photo electrochemical Hydrogen Production, Second Annual Renewable Energy Conference," Arkansas State University, Jonesboro, April 19th, 2011
3. **Rajesh Sharma**, "Development of surface engineered nanostructured photoanodes for enhanced photo electrochemical processes," presented at IEEE Industry Applications Society 43rd Annual Meeting, Houston, October 3-6, 2010.
4. **R. Sharma**, P.P. Das, M. Misra, V. Mahajan, J. Bock, S. Trigwell, A.S.Biris, and M. K. Mazumder, "Photo electrochemical performance of Plasma treated Titanium-di-oxide nanostructures," Materials Research Society Fall Meeting, Boston, MA, December 1st, 2008.
5. **R. Sharma**, M. Misra, V. Mahajan, P. Das, J. Bock, A.S.Biris, M. K. Mazumder, "Application of atmospheric-pressure plasma for enhancing photoelectrochemical properties of TiO₂ electrodes," IEEE Industry Applications Society 43rd Annual Meeting, Edmonton, Canada, October 7th, 2008.
6. **Rajesh Sharma**, Jacob P. Bock, Alexandru S. Biris, Frank Hardcastle, "Titanium Dioxide nanostructured Photoanodes for Photoelectrochemical Hydrogen Production," 64th Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 2nd, 2008.
7. **R. Sharma**, C. Wyatt, C. Calle, N. Mardesich, and M. K. Mazumder, "Performance Analysis of Electrodynamic Self-cleaning Transparent Films for its Applications to Mars and Lunar Missions," IEEE- Industry Applications Society 42nd Annual Meeting, New Orleans, LA, September 24th, 2007.
8. **R. Sharma**, J. Cui and M. K. Mazumder, "Optimization of Surface State Density and Surface Structures of TiO₂ Photo-anodes for Increasing Light Absorption and Photo-Conversion Efficiency," Department of Chemical and Mechanical Engineering, University of Nevada, Reno, NV, September 14th, 2007. (**Invited colloquium presentation**)
9. **R. Sharma**, J. J. Diaz, V. Saini, A. S. Biris, and M. K. Mazumder, "Structural Properties of Atmospheric-Plasma treated Nanocrystalline TiO₂ for Photovoltaic Applications" Electrostatic Society of America Annual Meeting, Purdue University, West Lafayette, IN, June 13th, 2007.
10. **R. Sharma**, D. W. Clark, P. K. Srirama, M. K. Mazumder, "Contact charging of Martian Dust Simulant," ESA/IEEE/IEJ/SFE Joint Conference on Electrostatics, University of California, Berkeley, CA, 2006.