

## **DEEPAK SAINJU**

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### **APPOINTMENTS:**

Assistant Professor in Residence, Department of Physics, University of Connecticut, Storrs, CT. (2017)

Associate Professor, Natural and Physical Sciences Department, Northwest Vista College, San Antonio, TX. (2007 – 2017)

Visiting Faculty, Department of Physics, University of Texas at San Antonio, San Antonio, TX. (2016 – 2017)

### **EDUCATION:**

Ph.D., Physics, University of Toledo, Toledo, OH; Advisor: Prof. Robert W. Collins; Thesis title: Spectroscopic Ellipsometry Studies of Ag and ZnO Thin Films and Their Interfaces for Thin Film Photovoltaics.

MS, Physics, The Pennsylvania State University, University Park, PA; Advisor: Prof. Robert W. Collins.

MS, Physics, University of Cincinnati, Cincinnati, OH.

M.Sc. (US BS equivalent), Physics, Tribhuvan University, Nepal.

B.Sc. (US Associate equivalent), Physics-Statistics-Math, Tribhuvan University, Nepal.

### **RECENT FUNDING:**

Co-PI in NSF's Advanced Technological Education (ATE) and Texas Workforce Commission grants (worth \$1.26 million) to promote advanced material and nanotechnology. (2016)

## **WORK EXPERIENCE:**

**2017: Assistant Professor in Residence, University of Connecticut, Storrs, CT.**

**2007 - 2017: Tenure-track instructor (Fall 2007); Assistant Professor (Fall 2011); Tenure granted (Fall 2013); and Associate Professor (Fall 2015), Natural and Physical Sciences Department, Northwest Vista College (NVC), San Antonio, TX.**

Teaching college physics (algebra-based), university physics (calculus-based), and conceptual physics (non-quantitative) lecture and lab classes to undergraduates. Completed Cooperative Learning and Critical Thinking training. Serving as an advisor to NVC Nanotechnology club. Participating in student advising activity in departmental as well as college level. Participated in a workshop organized by Penn State University to use Nanotechnology equipments in class room by remote access. Co-PI in recently (September, 2016) awarded NSF Advanced Technological Education (ATE) and Texas Workforce Commission grants (worth more than \$1.2 million to establish an institute of material technology to address the critical industry-defined technical education and training needs in advanced materials technology, and to promote advanced material and nanotechnology. Working in a team, called Pathways Committee, to brainstorm and implement different strategies to help students be successful as they transition from high school to college. Volunteered as a judge in a state-wide Exxon Mobil Texas Science and Engineering fair. Participated in The San Antonio Mathematics and Science Education Partnership (SAMSEP) brainstorming/planning meeting for K-16 STEM educators organized by Univ. of Texas at San Antonio. Participated in elementary-, middle-, and high school student science enrichment activities. Served on various college committee. Volunteered on various campus activities. Participated in several Faculty and Employee Development sessions. Conducted research in Thin Film Photovoltaics to complete Ph.D. from University of Toledo.

**2004 – 2007 and intermittently till 05/2015: Graduate Research Assistant, Wright Center for Photovoltaics Innovation and Commercialization, and Physics Department, University of Toledo, Toledo, OH.**

Performed magnetron sputtering depositions of back-reflectors (angstrom thick silver/ZnO layers) and other materials for thin film amorphous silicon, CIGS, and CdTe solar cells; and characterized them by real time spectroscopic ellipsometry, reflection/transmission spectroscopy and AFM, including detail data analysis, simulation and modeling. Worked on computational modeling of amorphous silicon solar cells (single and triple junction) and their back-reflector. Taught few classes to junior/senior undergraduates in optics and laser courses when advisor was out for the conferences and meetings.

**2002 – 2004: Graduate Teaching and Research Assistant, Physics Department, and Material Research Institute, The Pennsylvania State University, University Park, PA.**

As a TA, taught introductory and university physics (all sections) recitation and lab classes to undergraduates, and advanced modern physics lab to graduate students; held office hours and performed grading. Performed independent study and research in nanomaterial synthesis, various spectroscopic instruments (FTIR, UV-VIS-NIR, reflection, transmission, ellipsometry), and microscopy (STM, TEM and SEM).

**1999 – 2001: Graduate Teaching Assistant, Physics Department, University of Cincinnati, Cincinnati, OH.**

Taught all section of college physics and university physics recitation (including an interactive recitation *Tutorials in Introductory Physics*) and lab classes to undergraduates; held office hours and performed grading.

**1995 – 1999: Founding chairman, CEO and instructor, Nobel Institute, Kathmandu, Nepal.**

Taught TOEFL, IELTS and high school Physics and English. Besides executive work, performed other diverse works such as counseling students; designing institute's brochures; writing advertisements for newspaper, TV and radio. Nobel was a very successful tutorial, training and consulting institute. Nobel's financial gain was more than a thousand fold.

**1997 – 1998:** Assistant Lecturer of Physics, Central Department of Physics, Tribhuvan University, Kathmandu, Nepal.

**1994:** Personal tutor for junior high school students for English.

**1992:** In the month of February and March, interviewed 33 research scientists in Bangladesh; and from May to December, interviewed 32 research scientists in Nepal in eight different scientific and technological disciplines on behalf of a professor of Sociology of University of Pittsburgh, PA.

**COMPUTER SKILLS:**

Mathematica, Origin graphing and analysis software, C programming, C++ programming, and Microsoft Office (Word, Excel, and Power Point).

## **PUBLICATIONS:**

“Real time Spectroscopic Ellipsometry of Ag/ZnO and Al/ZnO Interfaces for Back-Reflectors in Thin Film Si:H Photovoltaics”, Lila Raj Dahal, Deepak Sainju, N.J. Podraza, S. Marsillac, R. W. Collins, *Thin Solid Film* 519 (2011) 2682-2687

“Comparison of Al/ZnO and Ag/ZnO Interfaces of Back-Reflectors for Thin Film Si Photovoltaics”, Lila R Dahal, Deepak Sainju, Jian Li, N.J. Podraza, and Robert W Collins, *34<sup>th</sup> IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference*, Philadelphia, PA, June 7-12, 2009.

“Spectroscopic Ellipsometry Studies of In<sub>2</sub>S<sub>3</sub> Top Window and Mo Back Contacts in Chalcopyrite Photovoltaics Technology”, S. Marsillac, N. Barreau, H. Khatri, J. Li, D.Sainju, A. Parikh, N.J. Podraza, R. W. Collins, *Physica Status Solidi (C)*5, No. 5, 1244-1248 (2008).

“Plasmonic Characteristics of Ag/ZnO Back-Reflectors for Thin Film Si Photovoltaics”, L.R. Dahal, D. Sainju, J.Li, J.A. Stoke, N.J. Podraza, X. Deng, and R.W. Collins, *33<sup>rd</sup> IEEE Photovoltaics Specialists Conference (PVSC 2008)*, San Diego, CA, May 11-16, 2008.

“Analysis and Optimization of Thin Film Photovoltaic Materials and Device Fabrication by Real Time Spectroscopic Ellipsometry.” J. Li, J.A. Stoke, N.J. Podraza, D. Sainju, A. Parikh, X. Cao, H. Khatri, N. Barreau, S. Marsillac, X. Deng and R. W. Collins, *SPIE (International Society for Optical Engineering) Proceedings* Vol. 6651-6, 3 October 2007. (Invited Paper)

“Origin of Optical Losses in Ag/ZnO Back-Reflectors for Thin Film Si Photovoltaics,” D. Sainju, P.J. van den Oever, N.J. Podraza, M. Syed, J.A. Stoke, Jie Chen, Xiesen Yang, Xunming Deng, and R.W. Collins, *Proceedings of the 4<sup>th</sup> World Conference on Photovoltaic Energy Conversion*, (2006).

“Multilayer Analysis of the CdTe Solar Cell Structure by Spectroscopic Ellipsometry,” Jie Chen, Jian Li, D. Sainju, K.D. Wells, N.J. Podraza, and R.W. Collins, *Proceedings of the 4<sup>th</sup> World Conference on Photovoltaic Energy Conversion*, (2006).

“Transparent Conducting Oxide Sculptured Thin Films for Photovoltaic Applications,” N.J. Podraza, Chi Chen, D. Sainju, O. Ezekoye, M.W. Horn, C.R. Wronski, and R.W. Collins, *Material Research Society Proceedings* **865**, F.7.1.1-6 (2005)

“Optical Properties of Transparent Conducting Oxide Sculptured Thin Films for Applications in Thin Film Silicon Photovoltaics,” N.J. Podraza, Chi Chen, J.M. Flores, D. Sainju, Ilsin An, G.M. Ferreira, C.R. Wronski, M.W. Horn, R. Messier, and R.W. Collins, *Proceedings of the 31<sup>st</sup> Photovoltaics Specialists Conference*, (2005).

### **Other Papers:**

“Optical Properties of ZnO”, *Masters Paper, The Pennsylvania State University* (2004)

“Where Did the Universe Come From?”, *Technology*, Nepal (1997)

**CONFERENCES & PRESENTATIONS:** (\* given by a collaborator)

- 04/12 "Solar Cells", D. Sainju, Science and Engineering Conference, Northwest Vista College, San Antonio, TX (Local conference.)
- 05/10\* "Real Time Spectroscopic Ellipsometry of Al/ZnO and Ag/ZnO Back-reflector Interfaces for Thin Film Si:H Photovoltaics," Lila R Dahal, Deepak Sainju , Dinesh Attygalle, Zhiquan Huang, N. J. Podraza, Michelle Sestak , Robert W. Collins. *University of Toledo, Toledo, OH, United States ICSE-V (5th Int. Conf. on Spec. Ellip.)* 23-28 May 2010 (Albany, NY)
- 03/08\* “Optical Properties of Ag/ZnO Back-Reflectors for Thin Film Si Photovoltaics”, R.W. Collins, D.Sainju, L.R. Dahal, J. Li, J.A. Stoke, N.J. Podraza, and X. Deng, *MRS Spring Meeting*, San Francisco, Ca, March 24-28, 2008.
- 03/08\* “Accurate Determination of Dielectric Functions of Thin Films and Interfaces in Photovoltaic Devices: Critical Issues in Optical Modeling”, J. Li, A. Parikh, J.Chen, D. Sainju, L.R. Dahal, J.A. Stoke, N.J. Podraza, and R.W. Collins, *MRS Spring Meeting*, San Francisco, Ca, March 24-28, 2008.
- 01/05\* “Optical Properties of Transparent Conducting Oxide Sculptured Thin Films for Applications in Thin Film Silicon Photovoltaics,” N.J. Podraza, Chi Chen, J.M. Flores, D. Sainju, Ilsin An, G.M. Ferreira, C.R. Wronski, M.W. Horn, R. Messier, and R.W. Collins, Contributed Talk, *31<sup>st</sup> Photovoltaics Specialist Conference*, Lake Buena Vista, Florida (2005)
- 04/07\* “Optical Properties of Ag/ZnO Interfaces and Associated Losses in Back-reflectors for Thin Film Si Photovoltaics,” D. Sainju, A. Parikh, N. J. Podraza, P. J. van den Oever, M. Syed, X. Deng, and R.W. Collins, *Material Research Society Proceedings Spring 2007*, San Francisco, CA, April 9-13,2007.
- 04/05\* “Transparent Conducting Oxide Sculptured Thin Films for Photovoltaic Applications,” N.J. Podraza, Chi Chen, D. Sainju, O. Ezekoye, M.W. Horn, C.R. Wronski, and R.W. Collins, Contributed Talk, *2005 Materials Research Society Spring Meeting*, San Francisco, California (2005).
- 03/06 “Interface Dielectric Function in ZnO/Ag Structures for Applications as Back-Reflectors in Thin Film Solar Cells,” D.Sainju, N.J. Podraza, J. Li, M. Syed, R.W. Collins, Contributed Talk, *American Physical Society March Meeting*, Baltimore, Maryland (2006)

- 04/06\* “Dielectric Functions of a-Si<sub>1-x</sub>Ge<sub>x</sub>:H vs. Ge content and Temperature: Advances in Optical Function Parameterization,” N.J. Podraza, D.Sainju, C.R. Wronski, and R.W. Collins, Poster Presentation, *2006 Materials Research Society Spring Meeting*, San Francisco, California (2006)
- 05/06\* “Origin of Optical Losses in Ag/ZnO Back-Reflectors for Thin Film Si Photovoltaics,” D. Sainju, P.J. van de Oever, N.J. Podraza, Jie Chen, J.A. Stoke, Xiesen Yang, Maarij Syed, R.W. Collins, and Xunming Deng, Contributed Talk, *2006 4<sup>th</sup> World Conference on Photovoltaic Energy Conversion*, Waikoloa, Hawaii (2006)
- 05/06\* “Multilayer Analysis of the CdTe Solar Cell Structure by Spectroscopic Ellipsometry,” Jie Chen, Jian Li, D. Sainju, K.D. Wells, N.J. Podraza, and R.W. Collins, Poster Presentation, *Proceedings of the 4<sup>th</sup> World Conference on Photovoltaic Energy Conversion*, Waikoloa, Hawaii (2006).

### **COURSEWORK (OVERVIEW):**

Physics: Classical Mechanics and Dynamics; Statistical Mechanics; Electromagnetism; Electronics; Electrodynamics; Quantum Mechanics; Spectroscopy; Nuclear Physics; Solid State Physics; and Laboratory courses.

Optics: Optics of Solids, Films, and Nanoparticles; and Ellipsometry and Polarized Light.

Math and Statistics: Math I (Differential Calculus, Integral Calculus, Differential Equations, and Analytical Geometry); Math II (Linear Algebra, and Real Analysis); Math III (Vector Calculus, Differential Equations, Statics, and Dynamics); Math Physics; Mathematical Physics; Statistics I (Theoretical Statistics); and Statistics II (Applied Statistics).

Computer Programming: Mathematica; C Programming; and C++ Programming.

English: Optional English; and Improving Pronunciation.

Material Science and Engineering: Scanning Electron Microscopy; and Transmission Electron Microscopy.

### **AWARDS AND HONORS:**

Duncan Fellowship: The Pennsylvania State University

Graduate Teaching & Research Assistantships: University of Toledo, Pennsylvania State University, and University of Cincinnati

Letter of Appreciation, Nobel Academy, Nepal

**PROFESSIONAL MEMBERSHIP:**

**CURRENTLY & PREVIOUSLY HELD**

Life-member, Nepal Physical Society

Member, American Association of Physics Teachers (AAPT)

Member, American Physical Society (APS)

Member, Materials Research Society (MRS)

Member, The American Solar Energy Society (ASES)

Member, Texas Community College Teachers Association (TCCTA)