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TIBERIU D. ONUTA, Ph.D.

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PROFILE

Analyst with experience in emerging data science methodologies. Expertise with programming in C, R, and Python.

Languages: Romanian (native speaker), Moldavian (high fluency), French (reading proficiency)

Applied Physicist with experience in micro-fabrication, optics, materials, and bio-nanotechnology research with emphasis on the design and development of novel detection devices and spectroscopic techniques.

Materials Scientist with experience in formulating nonlinear multiferroic materials and producing all-thin-film cantilevers by integrating piezoelectric (PZT) and ferromagnetic materials, and also with experience in designing and implementing novel micro-sensors (MEMS) for the detection of low-intensity magnetic fields, as well as magnetic energy harvesters and multiferroic memory devices for DARPA project.

Research Scientist with expertise in designing and implementing optical setups for the sorting of fluorescent biomolecules in nanofluidic channels.

RESEARCH EXPERIENCE

University of Maryland, Baltimore County (UMBC) — **Baltimore, MD**
General Associate - Earth and Space Institute — 2017-2018

- Collected data from proton-irradiated CCD sensors and analyzed resulting images using R and Python programming.
- Designed strategies to reduce contamination of spacecraft instrument parts before and after launch.
- Organized activities in accordance to a verification matrix document for testing parts of a spacecraft instrument.

University of Maryland, College Park (UMD) — **College Park, MD**
Materials & Engineering Department
Visiting Researcher — 2013-2016
Research Associate — 2009-2013

- Designed and developed magnetic energy harvesters (DARPA-HUMS project).
- Devised and fabricated novel MEMS-based sensors for detecting magnetic fields.
- Implemented cleanroom microfabrication (e.g. ion-beam milling, xenon difluoride etching, sputtering, beam evaporation).
- Conducted research in thin-film deposition: through thermal evaporation, plasma enhanced – chemical vapor deposition (PE-CVD), and atomic layer deposition (ALD).
- Characterized devices and sensors using scanning electron microscopy (SEM).
- Designed and tested analog circuits.
- Initiated and wrote a research grant proposal for detecting field mines (SBIR solicitation).

Cornell University — **Ithaca, NY**
Postdoctoral Fellow - Applied Physics & Engineering — 2008-2009

- Built a complex optical setup to implement a confocal and epifluorescence method for collecting fluorescence bursts emitted by DNA molecules with fluorescent tags, and directing the fluorescence signals to high sensitivity single-photon counting detectors.
- Expertise in working with solid state continuous-wave (CW) lasers.
- Conceived and fabricated magnetic bead-based immunoassays.
- Developed a method for sorting of biomolecules (DNA) using nanofluidic channels and fluorescence microscopy.
- Applied cleanroom procedures and nano/microfabrication (e.g. silicon nitride deposition in LPCVD CMOS furnaces, e-beam lithography, fluorine-based etching of silicon oxide and nitride, photolithography mask writing on laser pattern generators).

- Designed and tested basic analog and digital circuits.
- Participated in writing a grant proposal for an epigenetics project (R01).

Indiana University **Bloomington, IN**
Research Assistant – Physics and Chemistry Department 2002-2008

- Implemented a new spectroscopic method called Near-Field Correlation Spectroscopy (NFCS).
- Designed, constructed and trouble-shot complex optical experimental setups related to NFCS and optical trapping.
- Fabricated optical nano-sensors and optical antennas using nano-sphere lithography and i-line photolithography.
- Developed micro-fluidic assays and succeeded in efficiently controlling the flow.
- Expertise in working with femtosecond (fs) ultrashort pulse lasers (Ti:Sapphire Coherent MIRA).
- Examined nano-sensors/optical antennas using microscopy: optical, fluorescent, confocal, dark-field, atomic-force microscopy (AFM), SEM.
- Studied nano-sensors/optical antennas using nonlinear optics and spectroscopy: second harmonic generation (SHG), two-photon photoluminescence (TPPL) and FTIR.

TEACHING EXPERIENCE

Indiana University **Bloomington, IN**
Associate Instructor - Chemistry Department 2005-2008
Physical Chemistry and Electronics Laboratory
General Chemistry Laboratory
Associate Instructor - Physics Department 2002-2003
General Physics Laboratory

Gh.Asachi Technical University **Iasi, Romania**
Lecturer - Mechanical Engineering Department 1999-2001
General Physics Laboratory and Discussion Sections

EDUCATION

Ph.D., **Physics** 2008
Indiana University, Bloomington, IN
M.Sc., Physics
Indiana University, Bloomington, IN 2004

B.Sc., **Physics** (first in class) 1999
Al. I. Cuza University, Iasi, Romania

M.Eng., **Applied Physics** (first in class) 1998
Gh. Asachi Technical University, Iasi, Romania

B.Eng., **Mechanical Engineering** 1995
Gh. Asachi Technical University, Iasi, Romania

Post-Baccalaureate Certificate in Professional Studies (Cyber Operations) expected May 2019
University of Maryland, Baltimore County (UMBC)

CERTIFICATIONS/SPECIALIZATIONS

Data Science Specialization (9 courses + 1 capstone project), Coursera 09/2017
Machine Learning, Coursera 07/2016
Introduction in Big Data, Coursera 08/2016
Cryptography I, Coursera 09/2016

SKILLS

Programming: R, Python, Matlab, Octave, C/C++, PV-WAVE, IDL
Control: LabVIEW
Computer Aided Design: AutoCAD platform

tdanonuta@gmail.com **TIBERIU D. ONUTA, Ph.D.**
Languages: English, Romanian, French

PUBLICATIONS

- Y. Wang, **T.-D. Onuta**, and I.Takeuchi – Colossal Magnetoelectric Effect Caused by Parametric Amplification, *Applied Physics Letters* 107 (2015) 192902.
- **T.-D. Onuta**, Y. Wang, S.E. Lofland, and I.Takeuchi – Multiferroic operation of dynamic memory based on heterostructured cantilevers, *Advanced Materials* 27(2) (2015) 202-206.
- **T.-D. Onuta**, Y. Wang, C.J. Long, S.E. Lofland, and I.Takeuchi – Dynamic state switching in nonlinear multiferroic cantilevers, *Applied Physics Letters* 101 (2012) 043506.
- **T.-D. Onuta**, Y. Wang, C. J. Long, I. Takeuchi – Energy harvesting properties of all-thin-film multiferroic cantilevers, *Applied Physics Letters* 99 (2011) 203506.
- **T.-D. Onuta**, M. Waegele, C. DuFort, W.L. Schaich, B. Dragnea – Optical Field Enhancement at Cusps between Adjacent Nanoapertures, *Nano Letters* 7(3) (2007) 557-564.
- **T.-D. Onuta**, W.L. Schaich, B. Dragnea – Fluctuation Correlation Spectroscopy of Near-Field Trapped Nanoparticles, *Proceedings of SPIE*, Vol. 5736, Nanomanipulation with Light, Editor: David L. Andrews, March 2005, pp. 25-29.
- D. Amarie, **T.-D. Onuta**, R.A. Potyrailo, B. Dragnea – Submicrometer Cavity Surface Plasmon Sensors, *Journal of Physical Chemistry B* 109 (2005) 15515 -15519.
- E.-S. Kwak, **T.-D. Onuta**, D. Amarie, R.A. Potyrailo, B. Stein, S.C. Jacobson, W.L. Schaich, B. Dragnea – Optical Trapping with Integrated Near-Field Apertures, *Journal of Physical Chemistry B* 108 (2004) 13607-13612.
- K.D. Kloepper, **T.-D. Onuta**, D. Amarie, B. Dragnea – Field - Induced Interfacial Properties of Gold Nanoparticles in AC Microelectrophoretic Experiments, *Journal of Physical Chemistry B* 108 (2004) 2547-2553.
- L. Badelita, V. Stancu, **T.-D. Onuta** – The Relativistic Conservative Dynamics of a Particle in Different Molecular Potentials, *Hadronic Journal* 22 (1999) 453-456.
- I. Merches, **T.-D. Onuta** – An Analytical Formulation in the Theory of Gravitomagnetic Systems, *Scientific Annals of "Al. I. Cuza" University – Iasi*, Tom XLIII – XLIV, s. l. b. fasc. 2, Solid State Physics – Theoretical Physics, 1997 – 1998.

CONFERENCES

- Y. Wang**, T.-D. Onuta**, C.J. Long, S.E. Lofland, I. Takeuchi – All-thin-film PZT/FeGa multiferroic cantilevers and their applications in switching devices and parametric amplification (**talk**), American Physical Society (APS) March Meeting, Denver, Colorado, 3-7 March, 2014.
- **T.-D. Onuta**, I. Takeuchi – Nonlinear dynamics of multiferroic cantilevers (**poster**), Mid-Atlantic Micro/Nano Alliance, Spring 2013 Symposium, National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, 14 May, 2013.
- **T.-D. Onuta**, Y. Wang, I. Takeuchi – Nonlinear dynamics of multiferroic cantilevers (**poster**), 3rd International PiezoMEMS Workshop, Washington DC, 9-10 April, 2013.
- **T.-D. Onuta** – All-thin-film multiferroic heterostructured cantilevers in linear and nonlinear dynamic regimes (**oral presentation**), American Physical Society (APS) March Meeting, Baltimore, Maryland, 18-22 March, 2013.
- **T.-D. Onuta** – Nonlinear dynamics of multiferroic cantilevers (**invited talk**), Electronic Materials and Applications (EMA) 2013, American Ceramic Society (ACS), Orlando, Florida, 23-25 January, 2013.
- **T.-D. Onuta**, I. Takeuchi – DARPA-HUMS Meeting, Arlington, Virginia, 14-15 November, 2011 (**poster**).
- **T.-D. Onuta**, I. Takeuchi – Fabrication of MEMS-based cantilever arrays on multiferroic thin-film heterostructures for magnetic field sensing (**poster**), DARPA-HUMS Program Review, Newport, Rhode Island, 14-15 October, 2010.
- D. Ursu, **T.-D. Onuta**, C. Ciubotariu – A Langevin-Debye Approach to Ergotic Optical Tweezers, Advances in Intelligent Systems and Technologies, Proceedings ECIT2006 – 4th European Conference on Intelligent Systems and Technologies, Iasi, Romania, Sep. 21-23, 2006 (**conference paper**).

- M. Chipara, J. Zaleski, B. Dragnea, E. Shansky, **T. Onuta** – Self-Healing Polymers for Space Applications , 47th AIAA/ASME/ ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, May 1-4, 2006, Newport, RI (**conference paper**).
- **T.-D. Onuta**, S.E. Aniagyei, J. Chung, B. Dragnea – Near-Field Trapped Nanoparticles as Sensors for Protein Binding, Indiana Biosensor Symposium, Indianapolis, IN, April 6, 2005 (**poster**).
- D. Amarie, **T.-D. Onuta**, B. Dragnea – Near-Field Optical Trapping of Single Viruses, Geilo NATO Advanced Study Institute on "Forces, Growth and Form in Soft Condensed Matter: At the Interface between Physics and Biology", Geilo, Norway, March 24 – April 3, 2003 (**award: best poster**).
- M. Andronescu, **T.-D. Onuta**, Y. Zhao – On The Designing of Proteins That Target Specific DNA Sequences, Computing Beyond Silicon Summer School, California Institute of Technology, Pasadena, CA, June 17 – July 17, 2002 (**project report and oral presentation**).

Other Publications

- **T.-D. Onuta** – Considerations on Strategy and Technology Interrelationships, *Small Wars Journal*, October 1st, 2015.

BOOKS

- D. Ursu, **T.-D. Onuta**, I. Grosu – Elements of Non-linear Dynamics and Defectoscopy, "TEHNICA-INFO" Publishing House, Chisinau – 2000, Republic of Moldova, ISBN 9975-63-002-2 (textbook written in Romanian).
- **T.-D. Onuta**, D. Ursu – Special Chapters of Electromagnetism, Part I – Light Scattering on a Spherical Particle, "PIM" Publishing House, Iasi – 2007, Romania, ISBN 97 -973-716-806-1 (textbook written in Romanian).

PROFESSIONAL AFFILIATIONS/ASSOCIATIONS

Baltimore Counsel of Foreign Affairs (BCFA)
Strategy Discussion Group (SDG), Arlington, VA
Nanobiotechnology Center (NBTC) at Cornell University, Ithaca, NY
American Physics Society (APS)