**[Somaiyeh Dadashi](https://sites.temple.edu/borguet/somaiyeh-dadashi/)**

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| Department of Chemistry  | Speaker phone with solid fill | : (267) 825 4303 |
| 130 Beury Hall  | Email with solid fill | : Somaiyeh.dadashi@temple.edu |
| Temple University  | Google-Scholar – Scientia | : [Scholar.google.it/citations/Somaiyeh-Dadashi](https://scholar.google.it/citations?user=ECMavpsAAAAJ&hl=en)  |
| 1901 N. 13th Street  | [This Photo](https://en.m.wikipedia.org/wiki/File%3ALinkedIn_logo_initials.png) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/) | : [linkedin.com/in/somaiyeh-dadashi](https://www.linkedin.com/in/somaiyeh-dadashi-ab2a83180/)  |
| Philadelphia, Pennsylvania 19122  | Dherik Barison - Stack Overflow | : [Researchgate.net/profile/Somaiyeh-Dadashi](https://www.researchgate.net/profile/Somaiyeh-Dadashi-2) |

**Summary**

I am a physical Chemist with over three years of experience developing and designing nonlinear optical laser techniques to study interfacial and confined water at geochemical and biological interfaces. A Materials/Nano engineer with six years of experience in synthesis, analysis, and characterization of nano and microstructured materials. Leading role in constructing a nonlinear optical microscope aimed at interdisciplinary research of imaging the interface of material and bio substrates. I Achieved hands-on experience with laser systems and scientific knowledge of surface-specific vibrational laser spectroscopy and microscopy using sum-frequency generation (SFG) and second harmonic generation (SHG) processes and laser fabrication of nanostructure material with potential impact in optical and therapeutic applications.

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| **Education** |  |
| Ph.D., Temple University, Philadelphia, Pennsylvania, USA  | 2018 –Present |
| Nonlinear Optical Studies of Interfaces |  |
| Advisor: Professor Eric Borguet |  |
| M.Sc., Tarbiat Modares University, Tehran, Iran | 2014-2017 |
| Advisor: Dr. Reza Poursalehi |  |
| Co-Advisor: Dr. Hamid Delavari |  |
| B.Sc., University of Maragheh, Azerbaijan, Iran | 2010-2014 |
| Characterization of hydroxyapatite and fluorapatite |  |
| Advisor: Dr. Behnam Seyyedi |  |
| **Research and Teaching Experience** |  |
| Temple University, Chemistry Department, Philadelphia, Pennsylvania |  |
| Research Assistant, The Borguet Lab  | 2019 –Present |
| Teaching Assistant, General Chemistry | 2018 –2019 |
| Teaching Assistant, Chemistry Techniques I and General Chemistry laboratories | 2018 –2019 |
| Tarbiat Modares University, Department of Engineering, Tehran, Iran |  |
| Research Assistant, NSlab | 2014–2017 |
| Teaching Assistant, Advanced characterization of nanomaterials  | 2015 |
| Teaching Assistant, Nanomaterial synthesis methods  | 2015 |
| Iran Tractor Manufacturing Company, Tabriz, Iran |  |
| Apprenticeship, Quality Control Laboratory | Aug 2014 – Sept 2014 |

**Skills**

The operation, maintenance, and repairs of:

-Ultrashort pulse laser systems: Monaco (semiconductor), Libra and Mira 900 (Ti:Sapphire)

-Topas-PrimePlus and Opera-HP Optical Parametric Amplifier (OPA)

Design and developments of nonlinear optical techniques: Surface specific vibrational spectroscopy and microscopy of solid/liquid interface and performing time and phase resolved SFG and SHG

Skilled in laser spectroscopy, microscopy and optical instrumentation, nanofabrication by Laser Ablation and Arc Discharge

Wet lab and clean room skills

Software: LabView, Igor pro, Microsoft Office, Clemex, Chem draw, Chem office, Xpert High Score, Mercury, Gaussian, Origin, Match for XRD analysis, OriginLab, Mendeley, EndNote

Programming language: Python, MATLAB

Markup languages: LATEX

Advanced Analysis: UV-Visible, Near-IR and fluorescence spectroscopy, X-Ray diffraction analysis (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Fourier transform infrared spectroscopy (FT-IR), Photoluminescence (PL), X-ray photoelectron spectroscopy (XPS), Inductively coupled plasma (ICP), Raman spectroscopy and microscopy

**Professional experience**

* Coordination of development of time resolved high resolution nonlinear optical microscopy and spectroscopy system for interfacial studies: Geochemical and biological interfaces
* Investigation of structure of water at mineral interfaces using SFG spectroscopy
* Investigation of confined water at cell/substrate interface using SFG Microscopy
* Studying interfacial solvent environment by measuring the vibrational lifetime of SCN- molecular probe at the α-Al2O3 (0001) surface
* Probing heterogeneous electric field of charged mineral oxide surface, α-Al2O3 (0001) surface, using Stark active molecule such as SCN-, NaN3,acetonitrile
* Calculation of Fresnel equations for reflection and transmission geometry for SFG experiments at mineral oxide/liquid interfaces
* Synthesis investigation of optical and photocatalytic properties of bismuth and bismuth oxide nanostructures by laser ablation in water and organic solvents
* Synthesis investigation of optical properties of iron and iron oxide nanostructures by laser ablation in water and organic solvents
* Synthesis and investigation of Bi/Bi2O3@Au nanoparticles by laser ablation/chemical method as contrast agent for X-ray computed tomography
* Synthesis and characterization of Bi@PEG nanoparticles both by laser ablation and arc-discharge in polyethylene glycol as contrast agent for X-ray computed tomography
* Synthesis, characterization and photocatalytic application of black wide band gap oxide nanostructures
* Synthesis and characterization of bismuth and iron nano alloys by laser ablation in acetone, methanol and deionized water
* Synthesis and characterization of copper and silver nano alloys by laser ablation in acetone
* Calculation of oxidation mechanism and optical properties of Bi/Bi2O3 nanoparticles by boundary element method, MNPBEM 14 toolbox-MATLAB
* Calculation of optical properties of Bi/Bi2O3 nanorods by boundary element method, MNPBEM 14 toolbox-MATLAB

**Leadership experience**

* Lead graduate student for construction and design of time-resolved high resolution nonlinear SHG and SFG microscope
* Engage cross-functionality with other researchers and engineers to design a nonlinear optics laboratory
* Mentoring undergraduate student for construction of SFG microscope, providing consistent feedback
* Stay up to date with the status of the equipment in the optics laboratory, maintain, investigate, and evaluate existing optical/optomechanical components and electronic systems

**Publications**

1. Bijoya Mandal, **Somaiyeh Dadashi**, Mark DelloStritto, Stefan M. Piontek, Michael L. Klein and Eric Borguet, Charged Solutes Show Faster Vibrational Dynamics at Oxide/Water Interfaces, Submitted.
2. **Somaiyeh Dadashi**, Bijoya Mandal, Eric Borguet, Influence of the spatially heterogeneous charge distribution on α-Al2O3(0001) and silica on the interfacial organization of acetonitrile-water mixtures, In progress.
3. Bijoya Mandal, **Somaiyeh Dadashi**, Eric Borguet, Detecting centrosymmetric molecules at interfaces s by vibrational Sum Frequency Generation Spectroscopy, In progress.
4. **S. Dadashi**, R. Poursalehi, and H. Delavari, Optical and Structural Properties of Oxidation Resistant Colloidal Bismuth/Gold Nanocomposite: An Efficient Nanoparticles Based Contrast Agent for X-ray Computed Tomography, Journal of Molecular Liquids. 254, 12-19, (2018).
5. **S. Dadashi**, R. Poursalehi, and H. Delavari, Stability, size, and optical and structural properties of Bismuth Based nanoparticles prepared by laser ablation in different carriers, Applied Physics A, 124:406, (2018).
6. **S. Dadashi**, R. Poursalehi, and H. Delavari, Formation, gradual oxidation mechanism and tunable optical properties of Bi/Bi2O3 nanoparticles prepared by Nd:YAG laser ablation in liquid: Dissolved oxygen as genesis of tractable oxidation, Materials Research Bulletin, 97, 421-427, (2018).
7. **S. Dadashi**, R. Poursalehi, and H. Delavari, PEGylated Bi Nanoparticles Prepared via Pulsed Nd:YAG Laser Ablation in liquid PEG: An Efficient Contrast Agent for X-ray Computed Tomography, Journal of Computer Methods in Biomechanics and Biomedical Engineering: Imaging and Visualization, 7:4, 420-427, (2018).
8. **S. Dadashi**, R. Poursalehi, and H. Delavari, Structural and Optical Properties of Pure Iron and Iron Oxide Nanoparticles Prepared via Pulsed Nd:YAG Laser Ablation in Liquid, Procedia Material Science, 11, 722-726, (2015).
9. **S. Dadashi**, R. Poursalehi, and H. Delavari, Optical properties and colloidal stability mechanism of bismuth nanoparticles prepared by Q-switched Nd: Yag laser ablation in liquid, Procedia Material Science, 11, 679-683, (2015).

**Conferences**

* **Somaiyeh Dadashi,** Narendra M Adhikari, Stefan Piontek, Zheming Wang, Eric Borguet, Determining the interfacial refractive index of water using surface specific vibrational sum frequency spectroscopy, Jul 30 - 31, 2022, Bryant University, Gordon Research Seminar, Poster.
* **Somaiyeh Dadashi,** Aashish Tuladhar, Bijoya Mandal, Rick Remsing, Eric Borguet Impact of nuclear quantum effects on vibrational relaxation dynamics of interfacial water, Jul 31 - Aug 5, 2022, Bryant University, Gordon Research Conference, Poster.
* **Somaiyeh Dadashi**, Bijoya Mandal, Aashish Tuladhar, Eric Borguet, Impact of nuclear quantum effects on interfacial hydrogen bonding network, ACS National Meeting Spring 2022, Division of Physical Chemistry, March 20-24, Oral presentation.
* Bijoya Mandal, **Somaiyeh Dadashi**, Eric Borguet, Detecting centrosymmetric molecules at interfaces by vibrational sum frequency generation spectroscopy, Division of Geochemistry, March 20-24, Oral presentation.
* Joy Zou, Bijoya Mandal, **Somaiyeh Dadashi**, Mark DelloStritto, Michael Klein, Eric Borguet**,** Probing the vibrational density of states (VDOS) at oxide-aqueous interfaces**,** Division of Geochemistry, March 20-24, Oral presentation.
* **Somaiyeh Dadashi**, Bijoya Mandal and Eric Borguet, Influence of the spatially heterogeneous charge distribution on α-Al2O3(0001) on the interfacial organization of acetonitrile-water mixtures, ACS National Meeting Spring 2021, Division of Geochemistry, April 5-16, Oral presentation.
* Bijoya Mandal, **Somaiyeh Dadashi** and Eric Borguet, Mark DelloStritto, Michael Klein, Probing the interfacial solvent environment by measuring the vibrational lifetime of SCN- at the α-Al2O3(0001) aqueous interface, ACS National Meeting Spring 2021, Division of Geochemistry, April 5-16, Oral presentation.
* **Somaiyeh Dadashi**, Eric Borguet, Vibrational Sum Frequency Generation Microscope, Chautauqua on Nonlinear Optics 2020, Department of Chemistry, Purdue University, West Lafayette, Indiana, May 18-22, Oral presentation.
* **Somaiyeh Dadashi**, Eric Borguet, Nonlinear Optical Studies of Interfaces, Siegman International School on Lasers, University of Rochester, July 2019, Poster presentation.
* **S. Dadashi**, R. Poursalehi, and H. Delavari, Optical and Structural Properties of Bismuth Nanoparticles Prepared by Pulsed Nd:YAG Laser Ablation in Liquid, 22nd Iranian Conference on Optic and Photonic, 26-28 January 2016, Poster presentation.
* R. Poursalehi, **S. Dadashi**, Synthesis of Cu-Ag Nanoparticles by Pulsed Nd:YAG Laser Ablation of Bulk Alloyed Target in Different Liquid Environments, 4th Conference on Advanced Nanoparticle Generation and Excitation by Lasers in Liquids, Germany, 9-12 May 2016, Poster presentation.

**Workshops**

* Chautauqua on Nonlinear Optics, Department of Chemistry, Purdue University, May 18-22, 2020.
* Chautauqua on Nonlinear Optics, Department of Chemistry, Purdue University, May 18-22, 2021.
* Siegman International School on Lasers, University of Rochester, July 2019.
* Siegman International School on Lasers, University of Warsaw, July 2020.
* CST Summer Workshop on Computing and Statistics, Jun 2019.
* Femto-UP: Ultrafast lasers technologies and applications, Mar 2020.
* An Introduction to application of MATLAB, Tarbiat Modares University, 2015.

**Honors and awards**

* Spectra Physics Grant for Siegman International School on Lasers, University of Rochester, July 2019.
* Honored and awarded for the best dissertation, Department of Materials Science and Engineering, Tarbiat Modares University, 2017.
* Honored as an outstanding student for a successful dissertation defense in Department of Materials Science and Engineering, Tarbiat Modares University, 2017.

**References**

Professor Eric Borguet, Professor of Chemistry, Department of Chemistry, Temple University, 2007-present

(215) 204-9696

eborguet@temple.edu

Professor Hai-Lung Dai, Laura H. Carnell Professor of Chemistry, Department of Chemistry, Temple University

(215) 204-4775

hldai@temple.edu

Dr. Reza Poursalehi, Assistant Professor Nanomaterials group, Department of Materials Engineering, Tarbiat Modares University, Tehran, Iran.

+98 21 82883997

[poursalehi@modares.ac.ir](file:///Users/somaiyehdadashi/Library/Mobile%20Documents/com~apple~CloudDocs/Personal%20folder/Green%20Card/poursalehi%40modares.ac.ir)

pursalehi@gmail.com

Dr. Hamid Delavari, Assistant Professor Nanomaterials group, Department of Materials Engineering, Tarbiat Modares University, Tehran, Iran.

+98 21 82883599

[hamid.delavari@modares.ac.ir](file:///Users/somaiyehdadashi/Library/Mobile%20Documents/com~apple~CloudDocs/Personal%20folder/Green%20Card/hamid.delavari%40modares.ac.ir)

[hamid.delavari@gmail.com](http://hamid.delavari@gmail.com)