# Shalaka Dewan, PhD

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## Summary

**Proactive and passionate Scientist/Engineer with 8+ years hands-on experience with lasers and complex optical assemblies (4 year industry experience) and a deep understanding of material surface chemistry. Lead a team to mature a laser product from prototype design to production. Eager to apply my inter-disciplinary expertise and new product development skills to innovative light-based technologies.**

## Education

**Ph.D., Chemistry, Temple University** 08/2009-07/2015

- Thesis: Role of ions in altering the molecular structure of water at SiO2 interfaces studied using Femto-second non-linear optical spectroscopy.

**M.S., Physical Chemistry; University of Mumbai, India** 06/2006-04/2008
**B.S., Chemistry; University of Mumbai, India** 06/2003-04/2006

## Professional Experience

**Laser Scientist – IPG Photonics Corporation** **01/2017-Present**

- **Project leader – New Product Development:** Acting as primary Optical Engineer and managing a new product development project right from inception through initial design and qualification, parts procurement, to successful prototype building and testing, while interfacing with mechanical engineers and production technicians.
- **Laser Reliability Scientist**: Working across all UV projects at Silicon Valley Technology Center and internal and external Metrology laboratories to identify sources of photo-contamination and apply cleaning protocols and material qualifications to improve product reliability.

**Post-doctoral Researcher, Whiting School of Engineering, Johns Hopkins University** 08/2015-08/2016

- Re-established a picosecond solid-state laser (SFG spectrometer, EKSPLA) facility, to design and successfully carry out non-linear optical surface vibrational spectroscopy of electrochemical interfaces.
- Designed and built a spectro-electrochemical cell to perform laser spectroscopy experiments on catalytic surfaces.

**Research Assistant, Temple University** 08/2009-06/2015

- Designed and performed experimental studies using ultrafast non-linear optical spectroscopy to investigated the structure and dynamic properties of interfacial water (femto-second regime) and ions at mineral surface, requiring in depth knowledge of surface chemistry and ultrafast lasers.

**Science Writer/ Editor, Cactus Communications** 2008-2009

## Technical Expertise

**Product Development and Optical Systems Design:**

- Designing next generation non-linear optical modules (UV lasers) and assemblies with emphasis on laser beam characterization, opto-mechanical testing, long-term reliability testing, precision mechanical mounting of components. Fiber optics and fiber coupling, Free-space optics.
- Optical design included Gaussian beam propagation, spherical beam shaping, compact telescope design, minimizing optical aberrations, identifying optical and mechanical tolerances, and ultra-clean product packaging.

**Laser Expertise:**

- High-mid power Pulsed UV laser modules, high power IR fiber lasers, DPSS lasers.
- Hands-on operation/troubleshooting of multiple optical and laser based system including: high power fiber lasers ultrafast Ti-Sapphire regenerative amplifiers (Coherent, Quantronix), picosecond Nd:YAG amplifier (EKSPLA), YLF pump lasers (Quantronix, Coherent), Ti:sapphire fs oscillators (Mira, Mire-seed) and optical parametric amplifiers (fs-TOPAS, Light Conversion, OPERA-SOLO Coherent).
- Designed experiments around optical spectrometers and CCD cameras and PMT detectors; Beam Analysis Instruments (Ophir M200S, 1780 Modescan), oscilloscopes, photomonitors, signal generators, electronic components.

**Technical Skills**:

| **Laboratory / Instrumentation** | **Metrology / Analytical** | **Software** |
|---|---|---|
| Clean Room and NPI process engineering | Laser Reliability measurements | Gaussian beam propagation in ReZonator, |
| Optical bench set ups for proof of concept testing and validations | Beam quality, Laser beam measurement | SNLO |
| High power pulsed laser beam characterizations | XPS analysis | MATLAB, Igor Pro |
| Testing for photo-contamination of optical components | UV-Vis, FTIR, Raman Spectroscopy | Zemax Optic Studio (Beginner) |
| Surface modification: chemical grafting, fabricating self-assembled monolayer | • GC-MS analysis<br>• TEM and SEM analysis | Molecular Dynamics Simulations (NAMD) |

# Publications and Awards

- Tuladhar, A., **Dewan, S**., Pezzotti, S., Brigiano, F. S., Creazzo, F., Gaigeot, M. P., & Borguet, E. (2020). Ions Tune Interfacial Water Structure and Modulate Hydrophobic Interactions at Silica Surfaces. *Journal of the American Chemical Society*, *142*(15), 6991-7000.
- **Dewan, S.,** Raciti, D., Liu, Y., Gracias, D. H., & Wang, C. (2018). Comparative Studies of Ethanol and Ethylene Glycol Oxidation on Platinum Electrocatalysts. *Topics in Catalysis*, *61*(9-11), 1035-1042
- **Dewan, S**., Odhner, J. H., Tibbetts, K. M., Afsari, S., Levis, R. J., & Borguet, E. (2016). Resolving the source of blue luminescence from alkyl-capped silicon nanoparticles synthesized by laser pulse ablation. *Journal of Materials Chemistry C*, *4*(28), 6894-6899.
- De**wan, S.,** Yeganeh, M. S., & Borguet, E. (2013). Experimental correlation between interfacial water structure and mineral reactivity. *The journal of physical chemistry letters*, *4*(11), 1977-1982.
- **Dewan, S.,** Carnevale, V., Bankura, A., Eftekhari-Bafrooei, A., Fiorin, G., Klein, M. L., & Borguet, E. (2014). Structure of water at charged interfaces: A molecular dynamics study. *Langmuir*, *30*(27), 8056-8065.
- Tuladhar, A., **Dewan, S**., Kubicki, J. D., & Borguet, E. (2016). Spectroscopy and ultrafast vibrational dynamics of strongly hydrogen bonded OH species at the α-Al2O3 (11$\bar{2}$0)/H2O interface. *The Journal of Physical Chemistry C*, *120*(29), 16153-16161.
  - 2015 Coblentz Society Student Award in Spectroscopy
  - Temple University Graduate Student Dissertation Award, Spring 2015
  - A.P. Rao Prize for best student (Undergraduate) in Chemistry Department, Ramnarain Ruia College, 2008

# Other Interests

Dance Instructor and Performer at Dance Identity, LLC. Sunnyvale.

Passionate about promoting women in STEM fields by volunteering as mentor for young students.