APARNA PILLI

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PROFILE

Ph.D. student in Chemistry at the University of North Texas.

With basic knowledge in direct growth of 2D materials/thin films, spectroscopic and surface analytical techniques, vacuum technology, spintronic devices, soft matter physics, computational quantum chemistry and nanomaterial fabrication; I am interested in solving challenging problems with real world implications.

EDUCATION

- Doctorate of Philosophy in Chemistry (**GPA** 3.85)
  University of North Texas, Denton, TX — 2015 – Present
- Master of Science- Bachelor of Science (dual degree – Physics & Chemistry) (**CGPA** 6.6/10)
  Indian Institute of Science Education and Research, MH India — 2014
- Senior School Certificate (89%)
  State Board of Education — 2008
- Secondary School Certificate (90%)
  Indian Council of Secondary Education — 2006

WORK & RESEARCH EXPERIENCE

- **Materials and Surface Science laboratory, Advisor: Dr. Jeffry A. Kelber – Ph.D. thesis**
  Department of Chemistry, University of North Texas, Denton TX — Dec 2015 – Present
  - ✓ Direct growth of novel electronic and spintronic 2D materials for beyond-CMOS applications.
  - ✓ Growing boron oxide on silicon to study plasma/surface interactions for doping and diffusion barrier applications
  - ✓ Graphene growth on metals and metal oxides to study interfacial interactions.
  - ✓ Surface science techniques to analyze thin films - *XPS, LEED, AFM, STM, RGA, AES*
  - ✓ Operating and maintaining Ultra-high vacuum systems - *equipped with PVD, CVD, ALD, MBE*
- **Teaching Assistant, General Chemistry laboratories CHEM1430, 1440**
  Department of Chemistry, University of North Texas, Denton TX — Aug 2015 – Present
- **Project Assistant, Computational Chemistry division.**
  Indian Institute of Chemical Technology- CSIR, Hyderabad IN — Oct 2014 – Mar 2015
  - ✓ Using *ab initio* QM calculations – Hartree-Fock, Density functional theory (DFT) and TDDFT methods *to perform investigative studies– metal ligands and donor-acceptor charge transfer excitation studies.*
  - ✓ Predicting DOS spectra, band structures, reorganization energy and electron hole mobility *in model systems like dye sensitized solar cells.*
- **Physical and Chemical characterization of colloidal floc systems – Master's thesis**
  Unilever Research and Development Center, Bangalore IN — June 2013 – Mar 2014
  - ✓ Hands-on research experience with spectroscopic techniques – *fractal dimension and particle sizer, SEM, XRD, FT- IR and Raman Spectroscopic techniques.*

- ✓ Purification of drinking water using novel techniques and optimization –
  achieved turbidity reduction, determined optimum conditions and tested end limits required for impurity-settling.

- **Tailoring the aspect ratio of nanorods using arrow and spherical-ended Silver nano-dumbbells**
  Nanoscience Lab, Indian Institute of Science Education and Research, Pune IN Jan 2013 – May 2013

  - ✓ Synthesis of arrow-ended and spherical-ended silver nanorods.
  - ✓ Tuning Surface Plasmon Resonance peak positions to favor optical light penetration in biological tissues.

- **Synthesis and Characterization of Silver-coated Silica core-shells**
  Nanoscience Lab, Indian Institute of Science Education and Research, Pune IN Aug 2012 – Dec 2012

  - ✓ Synthesis of metal-coated nano core-shells.
  - ✓ Phenomenal enhancement of Surface Plasmon Resonance (SPR) absorption.

- **To build an AOM based laser light intensity controller using PID system**
  Atomic Physics Lab, Indian Institute of Science Education and Research, Pune IN Aug 2011 – Dec 2011

  - ✓ Tuning PID control system using Ziegler and Nichols method.
  - ✓ To design and test an Acousto-optical modulator (AOM) based intensity control unit for laser light.

SKILL SET

- **2D thin film growth and deposition skills:**
  Physical Vapor Deposition (PVD)
  Chemical Vapor Deposition (CVD)
  Atomic Layer Deposition (ALD)
  Molecular Beam Epitaxy (MBE)

- **Surface analysis skills:**
  X-ray Photoelectron Spectroscopy (XPS)
  Low Energy Electron Diffraction (LEED)
  Atomic Force Microscopy (AFM)
  Scanning Tunneling Microscopy (STM)
  Mass Spectrometer (MS)
  Auger Electron Spectroscopy (AES)
  Residual Gas Analyser (RGA)

- **Spectroscopic characterization skills:**
  UV-Vis Spectroscopy
  Fourier Transform Infrared Spectroscopy (FT-IR)
  Raman Spectroscopy
  Dynamic Light Scattering (DLS)
  Fractal dimension and particle sizer
  Scanning Electron Microscopy (SEM)
  X-ray Diffraction (XRD)

- **Computational skills:**
  CasaXPS
  Python
  C
  MATLAB
  Java (Bluej)
  Origin, MS Word, MS PowerPoint, MS Excel

COURSE WORK

- **Physical & Analytical Chemistry:** Surface Chemistry, Quantum Chemistry, Solid-state and materials Chemistry, Physical Chemistry of Solutions and Advanced Molecular Spectroscopy.
- **Inorganic Chemistry:** Main group, Transition Metal Chemistry, Self-assembly and Polymer Chemistry.
- **Physics:** Material Science and Nanotechnology, Classical Mechanics, Classical Opitcs, Mathematical Methods in Physics, Atomic and Molecular Physics.

PUBLICATIONS

- Jones, J. C., Beauclair, B., Olanipekun, O., Lightbourne, S., **Pilli, A.**, Kelber, J. A., "Atomic layer deposition of h-BN(0001) on RuO_2(110)/Ru(0001)". J. Vac. Sci. Technol. A 35(1), Jan/Feb 2017
- J. A. Kelber, J. Jones, **A. Pilli**, Brock Beauclair "Graphene/Boron Nitride Heterostructures: Direct Growth by Scalable and Industrially Practical Methods" Elsevier Encyclopedia of Interfacial Chemistry: Ultrathin films- *Accepted*
- Molecular understanding on the influence of π-spacers in benzocarbazole based sensitizers and their structure-property relationship for DSSC applications (*in prep)*
- Floc characterization and rheological studies in the context of drinking water *(in prep)*

AWARDS & HONORS

- Member of the Semiconductor Research Corporation (Student ID: 13739)
  https://www.src.org/ — Jan 2017 – Present
- Teaching Assistantship Benefit (Tuition Benefit Program)
  Department of Chemistry, University of North Texas, Denton TX — Aug 2015 – Present
- INSPIRE fellow (Project Code **CSC 0107**)
  Indian Institute of Chemical Technology- CSIR, Hyderabad IN — Oct 2014 – Mar 2015
- INSPIRE scholarship, Department of Science and Technology, Government of India.
  Indian Institute of Science Education and Research, Pune IN — Aug 2009 – May 2014
- Dean's list
- *Indian Institute of Science Education and Research, Pune IN* — Aug 2010 – Dec 2010
- All India Rank (AIR# 369) in IIT-JEE Standardized Test
  Indian Institute of Technology, Joint Entrance Examination (IIT-JEE) — 2009
- Gold medal recipient and Valedictorian
  Secondary School Board Examination, IN — 2006
- Certificate of merit for Academic Excellency
  Secondary Education, IN — 2000 – 2005
- Science Olympiad — 2003