

Amuthan Dekshinamoorthy



- **Nationality:** Indian
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WORK EXPERIENCE

J-1 Graduate Student Intern

Temple University [01 Jan 2023 – current]

Supervisor: *Prof. Eric Borguet*

City: Philadelphia

Country: USA

Investigating the electronic properties of 2D materials using the Scanning Tunneling Microscopy (STM) and Spectroscopy (STS) under liquid and ambient environment. Scanning tunneling microscopy of Self assemble monolayers (SAMs). Atomic force microscopy of 2D materials.

Junior Research Fellow

CSIR-Central Electrochemical Research Institute (CECRI) [12 Jun 2017 – 18 Apr 2020]

Supervisor: *Dr. Saranyan Vijayaraghavan*

City: Karaikudi

Country: India

A well-equipped Scanning Probe Microscopy lab was setup. This includes building up a fully air-conditioned, clean, vibration free lab space with uninterrupted power supply. A highly sophisticated Low Temperature Scanning Tunneling Microscope (LT-STM) with E-beam evaporator was installed (Scienta Omicron, Germany). This STM (Fermi Drycool) can achieve low temperatures with closed loop cooling system, first of its kind in India. I was in-charge for the installation of new STM as well it's operation and maintenance. I learnt how to fabricate STM tips and load them into the UHV chamber. The system was then checked for atomic resolution using Si (111) single crystal. Ag (111) single crystal was introduced into UHV conditions. It was cleaned by consecutive sputtering and annealing cycles. Atomic resolution was obtained. I then studied depositing free base phthalocyanine (H₂Pc) onto Ag (111) surface using an inhouse UHV e-beam evaporator. The deposition conditions were optimized and Pcs were deposited. Then the samples were placed into the microscope for imaging. The system was cooled down to 13 K for measurements. Single phthalocyanine molecules were imaged.

Master Dissertation Project (Phase II) cum Internship (Student trainee)

ICAR-Central institute for Research on Cotton Technology [1 Apr 2016 – 30 Sep 2016]

Supervisor: *Dr. Vigneshwaran Nadanthangam*

City: Mumbai

Country: India

Nano-Cellulose was Synthesized using Acid Hydrolysis. The acid concentration, temperature, time and other experimental parameters were optimized. The synthesized nano-cellulose was characterized using XRD, SEM, Raman and AFM. The nano-cellulose was casted as thin film and was tested for piezoelectric properties.

EDUCATION AND TRAINING

PhD. (Engineering Sciences)

CSIR-CECRI [13 Aug 2019 – Current]

Address: College Road, Alagappapuram, 630003 Karaikudi (India)

www.cecri.res.in

Thesis: NANO-ARCHITECTONICS AS A PATHWAY FOR MOLECULAR ELECTRONIC DEVICES STUDIED USING SCANNING PROBE MICROSCOPE

I have been working with a UHV-LT-STM. We deposit molecules and image them using STM. I have deposited free base Phthalocyanine on Ag (111) surface, mono layers of metal chalcogenides and imaged them with LT-STM at our lab. I am interested in charge transfer between mono layer metal chalcogenides (WS_2 and MoS_2) and metal phthalocyanine with their applications in the field of electro catalysis (Hydrogen Evolution and Oxygen Evolution Reactions in particular).

Apart from STM, I have also dealt with room temperature AFM (Agilent Technologies, 5500) and Raman Spectroscopy (Horiba, Labram HR Evolution). I know the operation of a bipotentiostat (Autolab) and can perform basic electrochemical techniques like cyclic voltammetry, electrochemical impedance spectroscopy, liner polarization and chronoamperometry. Also, I study molecules on copper for the corrosion inhibition behavior in different corrosive medium.

M.Tech in Nanoscience and Technology

Anna University [Aug 2014 – 9 May 2016]

Address: Guindy, 600025 Chennai (India)

www.annauniv.edu

Final grade: First Class with Distinction

Thesis: Fabrication of a Piezoelectric Nanogenerator using aligned Nano-cellulose thin films.

B.E in Biotechnology

University of Mumbai [2010 – 2014]

Address: Mumbai (India)

Final grade: First Class with Distinction

Thesis: Phytochemical Extraction and Comparison from Roots of *Asparagus racemosus* (Shatavari) & Soil Testing

Higher Secondary Examination

Maharashtra State Board [2008 – 2010]

Address: Pune (India)

LANGUAGE SKILLS

Fluent in English, Hindi, Marathi and Tamil (both reading and writing)

French (Basic level – had a course in high school)

PUBLICATIONS

1. **Amuthan Dekshinamoorthy**, Karthik Krishnan, Shekhar Hansda, and Saranyan Vijayaraghavan. "Tuning the surface electronic structure of WS₂ with Zn-and Cu-phthalocyanine for improved hydrogen evolution reaction: Experimental and DFT investigation." *FlatChem* 39 (2023): 100499.
2. Samal, Pragnya Paramita*, **Amuthan Dekshinamoorthy***, Shivakami Arunachalam, Saranyan Vijayaraghavan, and Sailaja Krishnamurty. "Free base phthalocyanine coating as a superior corrosion inhibitor for copper surfaces: A combined experimental and theoretical study." *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 648 (2022): 129138. [* equal contribution]
3. Velmurugan, Ramasamy, **Dekshinamoorthy Amuthan**, Vijayaraghavan Saranyan, and Balasubramanian Subramanian. "In situ moulded troilite 2H phase FeS ultrathin electrodes via pulsed laser deposition for flexible solid state high capacity supercapacitor besides boosted electrocatalytic oxygen evolution reaction." *Journal of Materials Chemistry A* 11, no. 10 (2023): 5148-5165. [* equal contribution]
4. Sivaranjini, B., Umadevi, S., Khan, R. K., Pratibha, R., **Dekshinamoorthy, A.**, Vijayaraghavan, S., & Ganesh, V. (2021). Planar and Vertical Alignment of Rod-like and Bent-core Liquid Crystals Using Functionalized Indium Tin Oxide Substrates. *Liquid Crystals*, 1-15.
5. Chinnaiah, J., Kasian, O., **Dekshinamoorthy, A.**, Vijayaraghavan, S., Mayrhofer, K. J., Cherevko, S., & Scholz, F. (2021). Tuning the Anodic and Cathodic Dissolution of Gold by Varying the Surface Roughness.
 - a. *ChemElectroChem*, 8(8), 1524-1530.
6. Maruthapandian, V., Muthurasu, A., **Dekshinamoorthi, A.**, Aswathy, R., Vijayaraghavan, S., Muralidharan, S., & Saraswathy, V. (2019). Electrochemical Cathodic Treatment of Mild Steel as a Host for Ni(OH)₂ Catalyst for Oxygen Evolution Reaction in Alkaline Media. *ChemElectroChem*, 6(17), 4391-4401.
7. Krishnan, Karthik, **Amuthan Dekshinamoorthy**, Saranyan Vijayaraghavan, and Selvakumar Karuthapandi. "Exploring the electrochemical characteristics of the nucleobase-template assisted NiCo₂O₄ electrode for supercapacitors." *New Journal of Chemistry* 47, no. 13 (2023): 6235-6245.

RECOMMENDATIONS

Thesis Mentor

Name: Dr. Saranyan Vijayaraghavan

Email: saranyan.cecricri@gmail.com

Senior Scientist,

CMPD,

CSIR-CECRI,

Karaikudi,

India.

Doctoral Advisory Member

Name: Dr. Jeyabharathi Chinnaiah

Email: bharathchem2002@gmail.com

Scientist,

EMFD,

CSIR-CECRI,

Karaikudi,

India.

Masters Thesis Mentor

Name: Dr. Vigneshwaran Nandanathangam

Email: nvw75@yahoo.com

Principal Scientist,

ICAR-Central Institute for Research on Cotton Technology,

Adenwala Road, Matunga, Mumbai 400019.

Masters Course Co-Ordinator

Name: Dr. M. Arivanandhan

Email: arivucz@gmail.com

Professor,

CNST,

Anna University, Chennai

AWARDS

- **CSIR- Senior Research Fellowship for doctoral work**
- **Second Prize - for poster presentation entitled "Scanning Tunneling Microscopy: A tool to study materials at atomic level" in connection with National Science Day-2021**
- **First Prize - for paper presentation organized by Anna University-2016**

CONFERENCES AND SEMINARS

- **Workshop on "Micro-Nano Engineering: Concept to Product", 2012**
- **Trankscription2K13 - A national level workshop on fermentation Technology,2013**
- **GbioFin Entrepreneurship and Innovation Certificate, 2013**
- **Annual Biotechnology Training Program under the Aegis of Haffkine Institute, Mumbai in the year 2013**
- **UGC Sponsored Sort term course on New materials their characterization and applications, 2014 Workshop of Engineering Critical Thinking - 2015**
- **Training Programme on "Advances in Applications of Nanotechnology" by ICAR-CIRCOT - 2015**
- **Third International Workshop on Advanced Functional Materials (TIWAN-2015)**
- **One day workshop on Thin Film characterization - basic principles and practices organized by IIT-Madras - 2016**
- **Two days national seminar on "Nanobiomaterials" - 2016**
- **Poster Presentation at THINK NANO 2016 organized by CeNSE, IISc Bangalore**
- **Participated and Presented a poster at 19th National Conference on Corrosion Control, Bhubaneswar conducted by National Corrosion Council of India - 2018**
- **Presented a paper at 12th International symposium on electrochemical Science and Technology (iSAEST-12) - 2019**
- **One Day workshop on ""Electrochemistry for Materials and Bio-interfaces" at CSIR-CECRI, 2019**
- **Delivered Nobel day Lecture at CSIR-CECRI - 2021**
- **A talk on "Operation of Scanning Probe Microscope" for the Online Skill Development Program held by CSIR-CECRI -2022**
- **Presented a poster at Spin Polarized Scanning tunneling Microscopy (SPSTM – 8) at The Ohio State University, 2023**