

Kalyani Patrikar

✉ kr.patrikar@gmail.com

🌐 kalyanipatrikar.github.io

EDUCATION

Ph.D	Indian Institute of Technology Bombay Electrical Engineering	Jan. 2015 - Jun. 2021
M.Tech	Indian Institute of Technology Bombay Materials Science	Jul. 2011 - Jun. 2013
B.Tech	Visvesvaraya National Institute of Technology Metallurgical and Materials Engineering	Jul. 2007 - May. 2011

WORK EXPERIENCE

Early Career Fellow, *Indian Institute of Technology Gandhinagar* PRESENT

- Developing model to predict OFET contact resistance from properties of self assembled monolayer functionalized interface
- Developing models for dissociation at donor-acceptor interface in OPV

Senior Research Assistant, *Center for Excellence in Nanoelectronics* Jul. 2013 - Dec. 2014

- Optimized dielectric interface to improve thermal stability and mobility of organic transistors
- Ideated and fabricated metal oxide nanoparticles embedded in organic transistors for H₂S **sensors**

Intern, *Indian Nanoelectronics User Program* May - Jun. 2010

- Studied **self assembly** of Si **quantum dot** on SiO₂ and HfO₂ by ab-initio calculations
- Optimized process for self assembly from stressed Si thin films of varied morphologies, **fabricated** and characterized 100 nm Si quantum dot arrays on high-k dielectric HfO₂ film

PhD THESIS

Bulk and Interfacial Charge Transport in Organic Field Effect Transistors

Advisors: Prof. Dinesh Kabra (Physics), Prof. V. Ramgopal Rao (Electrical Engineering)

- Developed multiscale model and Monte Carlo based **algorithm** to simulate measured **temperature dependent** characteristics of organic transistors
- Reduced contact resistance in organic transistors by four orders with **self assembled monolayers**
- Demonstrated **novel mechanism** of self assembled monolayers in organic transistors
- Reported **highest mobility** for transistors of common DA polymers PTB7 and PTB7Th, by device engineering
- Established new **paradigm** for improving device performance by an order by pendant group substitution

M.TECH THESIS

Mechanical Properties of Hot Wire CVD a-SiC:H Thinfilms

Advisors: Prof. Rajiv Dusane (Materials Science), Prof. Prita Pant (Materials Science)

- **Synthesised** Silicon-Carbon alloy thinfilms with different combination of phases by hot wire **CVD**
- Measured thinfilm mechanical properties by **nanoindentation**, **modelled** data to obtain Young's modulus independent of nanoindenter displacement and substrate, correlated with film **microstructure**
- **Fabricated** and characterized a-SiC microbridges for MEMS

COURSES & ACADEMIC PROJECTS

- Fabricated and characterized **OLED** array, and bulk heterojunction **OPV** array
- Defined input **features** from sensor data; optimized a **neural network** motion classifier in **Python**
- Simulated MOSFET characteristics and electrostatics on Sentaurus **TCAD**

- **Teaching Assistant:** Physics of Transistors, VLSI Technology, Thermodynamics, Machine Learning, Communication Skills
- **Other Courses:** Solid State Devices, MEMS, Microelectronics Simulations, Characterization of Materials

TECHNICAL SKILLS

Thinfilm Technologies	PVD (System In-charge), CVD, Solution Processing, Lithography
Electrical Characterization	I-V, C-V, Cryogenic I-V, TLM, Four probe, EQE
Material Characterization	Nanoindentation, AFM, XPS, SEM, XRD, XRR, Raman
Lab Training	Class 100 and Class 1000 Clean Room, Glove Box, Chemistry Lab
Software	Gaussian09, Quantum Espresso, TCAD
Computation	Python, Matlab, GNU Octave

EXTRACURRICULAR ACHIEVEMENTS

- Institute Executive Member, part of IIT Bombay Post Graduate Academic Council (2012-2013)
- Silver in **Tennis** Indian Inter-Institute Tournament 2016
- **Blog** at "medium.com/@k.r.patrikar"
- High Altitude **Treks** completed in Uttarakhand, India

PUBLICATIONS

Journal

1. **Kalyani Patrikar**, Anirban Mondal, "Model predicting OFET contact resistance reduction by self assembled monolayers" Draft under preparation.
2. **Kalyani Patrikar**, Valipe Ramgopal Rao, and Dinesh Kabra, "Role of Charge Transfer Integral in Evolution of Charge Transport Properties of Polymer Semiconductors", Under Review at *Physical Review Applied*.
3. **Kalyani Patrikar**, Urvashi Bothra, Valipe Ramgopal Rao, and Dinesh Kabra, "Charge Carrier Doping As Mechanism of Self-Assembled Monolayers Functionalized Electrodes in Organic Field Effect Transistors", *Adv. Mater. Interfaces* 2021, 2101377.
<https://doi.org/10.1002/admi.202101377>
4. **Kalyani Patrikar**, Nakul Jain, Dwaipayan Chakraborty, Priya Johari, Valipe Ramgopal Rao, and Dinesh Kabra "Influence of Pendant Group on Mobility of Organic Thin Film Transistor in Correlation with Reorganization Energy of Molecules." *Advanced Functional Materials*, 29.8 (2019): 1805878.
<https://doi.org/10.1002/adfm.201805878>

Conference

1. "Role of Pendant Group in Organic Semiconductor Charge Transport Rate and Energetics", Oral presentation at *MRS Fall Symposium 2020*
2. "Interfacial Doping in Organic Semiconductors with Self Assembled Monolayer at Electrodes", Oral presentation at *MRS Fall Symposium 2020*
3. "Mechanical Properties of a-SiC:H Thinfilms" Oral presentation at 13th *European Vacuum Conference and 7th European Topical Conference on Hard Coatings 2014*
4. "Growth of Si Quantum dot/Nanocrystal on Hafnium Oxide films" Oral presentation at *International Conference on Nanotechnology- Materials and Composites Frontier Applications 2011*