Kalyani Patrikar

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EDUCATION

PhD	**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

Summary

I have extensive experience in device fabrication, device characterization including cryogenic characterization and nano-characterization, device modelling, density functional theory computations with molecules and thinfilms, and numerical and analytical simulations. I am interested in working with novel devices and physics. My strengths include analytical and writing skills.

Ph.D. THESIS

Charge Transport in Bulk and Interfaces of Organic Field Effect Transistors
Advisors: Prof. Dinesh Kabra (Physics, IIT Bombay), Prof. V. Ramgopal Rao (Electrical Engineering, IIT Bombay)

- Probed, modelled, and experimentally studied features of **charge transport** in various organic devices
- Demonstrated novel charge doping **mechanism** to explain device characteristics of OFETs with self assembled monolayers
- Developed **device models** to predict interface properties, and device characteristics, for OFETs functionalized with self assembled monolayers
- Demonstrated **reorganization energy** to be a key parameter influencing charge carrier mobility in Donor-Acceptor polymers by correlating DFT and experimental studies
- Performed Monte-Carlo Numerical **simulations** study to complement variable temperature device **measurements** to obtain interplay of molecular and thinfilm parameters in **charge transport** in polymers
- Fabricated and characterized solution processed as well as evaporated organic devices and thinfilms
- Studied molecular and interface properties via DFT to infer device properties

MASTER'S THESIS

Mechanical Properties of Hot Wire CVD a-SiC:H Thinfilms
Advisors: Prof. Rajiv Dusane, Prof. Prita Pant (Materials Science, IIT Bombay)

- Synthesised and characterzied Silicon-Carbon alloy thinfilms consisting of different combination of phases by **HWCVD** technique
- Studied thinfilm mechanical properties by **nanoindentation**, **modeled data** to obtain Young's modulus independent of nanoindenter displacement
- Fabricated and Characterized a-Si:C **microbridges**

WORK EXPERIENCE

- **Teaching Assistant, IIT Bombay** (Jan. 2015-Jun. 2021)
  - Involved in planning course content, conducting classes, and evaluating students in courses including "Physics of Transistors", "VLSI Technologies", "Communication Skills"
- **Senior Research Assistant, Center for Excellence in Nanoelectronics** (Jul. 2013 - Dec. 2014)
  - Analysed role of dielectric interface in OFET thermal **stability**
  - Improved mobility of solution processed OFETs by process and device stack **optimization**
- **Intern, Indian Nanoelectronic User Program** (May - Jun. 2010)
  - **Simulated** Si quantum dot-HfO_2 system by DFT to obtain lowest energy structure
  - **Fabricated** regular shaped 100 nm Si nanocrystals on HfO_2 thinfilms from CVD thinfilm for application in high-k dielectric flash memory devices

TECHNICAL SKILLS

Thinfilm Technologies:	PVD, CVD, Spin-coating, Lithograhy
Characterization:	Electrical characterization, XRD, Nanoindentation, AFM, XPS, SEM
Lab Training:	Class 100 and Class 1000 Clean Room, Glove Box, Chemistry Lab
Computation:	DFT tools (Gaussian09, Quantum Espresso), Python & Numpy, Maltab

EXTRACURRICULAR ACHIEVEMENTS

- **Institute Executive Member**, part of IIT Bombay PG Academic Council (2012-2013)
- Silver in **Tennis** Inter-Institute Tournament 2016
- Winning team at Institute "Research Only For Laughs (ROFL)" for explaining paper with a short sketch
- Blog at medium.com/@k.r.patrikar
- **High Altitude Treks** completed in Uttarakhand, India

PUBLICATIONS

Journal

1. **Kalyani Patrikar**, Valipe Ramgopal Rao, and Dinesh Kabra, "Role of Charge Transfer Integral in Evolution of Charge Transport Properties of Polymer Semiconductors", Under preparation
2. **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
3. **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
4. Nakul Jain, Rishabh Saxena, Sumukh Vaidhya, **Kalyani Patrikar**, V. Ramgopal Rao, Christopher R.McNeill and Dinesh Kabra, Quasi Fermi Level Splitting in Organic Bulk Hetro-Junction Solar Cell, submitted in Physical Review Letters

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 Monolayers at Electodes", **Oral** presentation at **MRS Fall Symposium 2020**.
3. "Mechanical Properties of a-SiC:H Thinfilms" **Oral** presention at 13^{th} European Vacuum Conference and 7^{th} European Topical Conference on Hard Coatings 2014

4. "Growth of Si Quantum dot/Nanocrystal on Hafnium Oxide films" **Oral** presntation at International Conference on Nanotechnology- Materials and Composites Frontier Applications 2011