# Arvind Pujari

## Education

**Oct 2020 - Sep 2024** — **MRes+PhD in Nanoscience and Nanotechnology (NanoDTC)**
*University of Cambridge, Cambridge, United Kingdom*
- Received the **Cambridge International Scholarship**, awarded to the top 80 incoming PhD students at Cambridge

**Aug 2016 - Jul 2020** — **B.Tech in Metallurgical and Materials Engineering**
*Indian Institute of Technology Madras, Chennai, India,* GPA: **8.90/10**
- Awarded the **Dr Shankar Dayal Sharma President of India Gold Medal** as the undergraduate student (out of a class of 900) with the best all round performance in curricular and extra-curricular activities between 2016-2020

## Research Experience

**Nov 2020 - Feb 2021** — **Microfluidic analysis of exosome-protein interactions at single-molecule level**
Guides: *Prof. Tuomas Knowles (Chemistry), Prof. Roisin Owens (Chemical Engineering), University of Cambridge, UK*
- Completed a 9 week interdisciplinary lab rotation on single molecule detection of exosomes, learnt how to use a confocal microscope, ultracenrifuge and basic biochemistry techniques
- Demonstrated that the (DigitalISA) method pioneered by the Knowles group can be used for highly-sensitive detection of exosomes with a low limit of detection (5 pM)
- Results included in a peer-reviewed paper currently at the major revision stage

**Aug 2019 - Jun 2020** — **Developing alternatives to noble metal plasmonics**
Guide: *Prof. Tiju Thomas, Department of Metallurgical and Materials Engineering, IIT Madras*
- Used **COMSOL** to perform **FEM simulations** on Al-Cu core-shell nanospheres and nanocubes
- Found that normalized scattering cross sections of Al@Cu nanocubes **increases linearly** with Cu shell thickness.
- Devised a simple numerical solution to study the light trapping behaviour of **Al-alloy nanoparticles**
- Created "maps" which provide a guide for plasmonic performance as a function of radius and alloy composition
- Work was one of only 8 projects across India to be awarded the **Innovative Student Projects Award** by the **Indian National Academy of Engineers** (INAE)
- Awarded the **B. Krishnamurthy Silver Medal** for the best undergraduate research project in IIT Madras

**May 2019 - Jul 2019** — **Synthesis of flow-through silica and titania inverse opal membranes**
Guide: *Prof. David Warsinger, Department of Mechanical Engineering, Purdue University, USA*
- Selected for a 9 week funded research internship through the Purdue Undergraduate Research Experience Program
- Fabricated **flow through inverse opal membranes** for desalination.
- Used a novel approach involving **anodization** of the aluminium and titanium substrates
- Anodization resulted in crack-filling of the inverse opals, the first time that such a phenomena had been observed

**May 2018 - Jul 2018** — **A low-cost device based on carbon quantum dots for the detection of mercury levels in water**
Guide: *Prof. Kabeer Jasuja, Department of Chemical Engineering, IIT Gandhinagar*
- Developed a **low-cost handheld device** for selective and sensitive **detection of Hg(II) ions in water** using PVA strips embedded with **carbon quantum dots**.
- Received the **Best Poster Award** at the SRIP Poster Presentation Competition at IIT Gandhinagar
- Developed explainer videos for a simplified potrayal of the groups research. (Link)

## Publications

**Papers**

**Arvind Pujari** and Tiju Thomas, "Aluminium Nanoparticles Alloyed with Other Earth-Abundant Plasmonic Metals for Light-Trapping in Thin-Film a-Si Solar Cells", *Sustainable Materials and Technologies*, (2021): e00247 (Link)

**Arvind Pujari** and Tiju Thomas, "Al-Cu core-shell nanoparticles as an alternative to noble metal plasmonics: A computational study", *Materials Chemistry and Physics*, 253 (2020): 123419 (Link)

Abhimanyu Swaroop, **Arvind Pujari** and Tiju Thomas, "Modelling core-shell plasmonic nanoparticles as homogenous systems: An effective refractive index approach ", *Manuscript Under Review*

**Posters**

**Arvind Pujari** and Kabeer Jasuja, "A low-cost hand-held device for the selective and sensitive detection of Hg(II) ions in water using paper strips embedded with carbon quantum dots", *SRIP Poster Presentation 2018*, IIT GN (Link)

**Applied Patents**

**Arvind Pujari** and Tiju Thomas, "Al-Cu core-shell nanoparticles with tunable optical spectra", Indian Patent (2019), Application No. 201941050328

**Arvind Pujari**, Santosh Behara and Tiju Thomas, "Two-Stage Grey Water Reactor for Distillation and Water Splitting Process", Indian Patent (2020), Application No. 336817-001

## Projects and Skills

**Sector: Sanitation**

**A Low Cost Mechanism for Public Toilet Sanitation** (Aug 2016 - Aug 2017)

- Designed a completely mechanical device for **public toilet sanitation**, which was implemented on the existing toilet structure.

**Awards:**

- Received the **Gandhian Young Technological Innovation Award** (GYTI 2017) at the **Rashtrapati Bhavan (President's House)** from the Head of WIPO, Dr. Francis Gurry on behalf of the **Government of India**
- Featured in the national column of the Times of India on the 1st of April, 2017

**Sector: Waste**

**Automatic Waste Segregating Dustbin** (Aug 2017 - Dec 2018)

- Team leader and principal designer of a **self-segregating dustbin**, which can identify and segregate waste, using deep learning and computer vision techniques.

**Awards:**

- Qualified for the **Singapore Regional Finals** of the **$1 million Hult Prize** and featured in the Chennai Times on the 13th of November, 2017.
- Won the **Silver Medal** at the **Campus Sustainability Challenge**, **7th Inter IIT Tech Meet**, IIT Bombay, 2018
- Received a **Rs 5 Lakh grant** for prototype development as one of **25 finalist teams out of 1000 applicants** at the **Carbon Zero Challenge (CZC) 2018** & the **Best Paper Award** at the **Shaastra Research Conference 2018**

**Skills**

ADVANCED: Python, Java, C, Autodesk Inventor, COMSOL, MATLAB, ImageJ, ParaView, Microsoft Office
INTERMEDIATE: HTML, LaTeX, Arduino, CNC Milling, Welding, 3D Printing

## Leadership and Hobbies

**Leadership**

**Head, Team Sahaay, Centre For Innovation (CFI), IIT M, 2018-19**:

- Mentored and managed more than **20 students** working on five different **socially relevant projects**
- Collaborated with **India's leading NGOs** like *Pathway India*.
- Encouraged higher female participation to achieve a 1:1 gender ratio in the club in 2019.

**Head, Editorial and Research, Entrepreneurship Cell (E-Cell) IIT M, 2017-18**:

- Was the **first sophomore to head a team in E-Cell**
- Chief Editor of *Entrepreneurship Insider*, **India's first student run entrepreneurship magazine**

**Languages & Hobbies**

- Fluent in **English, Hindi & Oriya**
- Member of the **hostel tennis team** & NSO tennis
- Regular stand-up comedy performer and public speaker in college
- Invited to address the 2019 IIT M freshman batch (1000 students) during their orientation
- Conducted frequent mentorship programs for first year undergrads