Harpreet SINGH

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EDUCATION

- **Ph.D in Electrochemistry | University of Lorraine, Nancy, France** 2021 - Nov 2024
- **M.Tech in Nanoscience and Nanotechnology | Panjab University, Chandigarh, India** 2016 - 2018
- **B.Tech in Electronics and Communication | Punjab Technical University, Jalandhar, India** 2011 - 2015

RESEARCH/WORK EXPERIENCE

- **Doctoral research | CNRS-LCPME, Villers-lès-Nancy, France** 2021 - Nov 2024
  ***In-situ* analysis of Ti3C2Tx MXene for electrochemical actuation**
  - Conducted in-situ analysis of Ti3C2Tx MXene for electrochemical actuation.
  - Expertise in material synthesis, specifically MXenes, and their functionalization and processing.
  - Proficient in device handling, programming, and electrochemical methods for in-situ/Operando analysis.
  - Engineered electrode designs to optimize performance.

- **Junior Research Fellow | Indian Institute of Technology Delhi (IITD), India** 2019 - 2021
  Biomedical sensors development
  - Developed microfluidic devices using photolithography and CO2 laser engraving, optimizing production processes.
  - Designed portable systems for real-time detection of pesticides and pathogens.
  - Contributed to scalable solutions for improving agricultural safety and public health.

- **Research Assistant | Interuniversitair Micro-Electronica Centrum (IMEC), Leuven, Belgium** 2018 - 2019
  Understanding the Fundamentals of Cross-Linking Type EUV-Resist Platform
  - Gained expertise in handling thin films (10-50 nm).
  - Analyzed thin films using spectroscopy and chromatography techniques.
  - Contributed to advancing EUV lithography for high-volume manufacturing.

- **Master's thesis | Panjab University, Chandigarh, India** 2017 - 2018
  2D TMD heterostructures for Hydrogen Evolution Reaction
  - Acquired skills in material handling and processing through wet chemistry and analytical techniques.
  - Evaluated MoSe2/WSe2 heterostructures for the Hydrogen Evolution Reaction (HER).

- **Bachelor's thesis | CSIR-CSIO, Chandigarh, India** 2015
  Crop Disease Predictive Model Development
  - Managed data acquisition systems to gather relevant agricultural data.
  - Developed predictive models for early forecasting of crop disease severity.

PATENT

Sandeep K. Jha, Syed Kasim D., **Harpreet Singh**, Shweta Panwar, Kingshuk Panda, Naveen Kumar Yadav, Sourav Dutta, Kirti, Tarun Singh, Rishi Raj. (2022). A System for Carrying Out Rapid Detection of Pathogens. European Patent, Application number: 21860791.9, Publication number: WO2022044054.

PUBLICATIONS

- **Singh**, **H.**, Chen, S., Francius G., Liu, L., Etienne, M., & Lee, P. S. (2024). Understanding In-Plane Sliding of Functionalized Ti3C2Tx MXene by In Situ Microscale Analysis of Electrochemical Actuation, *ACS Chemistry of Materials*, DOI: 10.1021/acs.chemmater.4c01597.

- Chen, S., Tan, S. F., **Singh, H**., Liu, L., Etienne, M., & Lee, P. S. (2023). Functionalized MXene Films with Substantially Improved Low-Voltage Actuation. *Advanced Materials*, 2307045.
- Rathore, A., Pollentier, I., Cipriani, M., **Singh, H**., De Simone, D., Ingólfsson, O., & De Gendt, S. (2021). Extreme Ultraviolet-Printability and Mechanistic Studies of Engineered Hydrogen Silsesquioxane Photoresist Systems. *ACS Applied* Polymer *Materials*.
- Rahul, **Singh, H**., Lalla, N. P., Deshpande, U., & Arora, S. K. (2021). Engineered MoSe2/WSe2-based heterostructures for efficient hydrogen evolution reaction. *Materials Today*: *Proceedings*.
- Jha, S. K., Soni, A., Raj, R., Bala, S., Sharma, K., Panwar, S., & **Singh, H**. (2021). Functionalization, Immobilization and Stabilization of Biomolecules in Microfluidic Devices. In *Immobilization Strategies* (pp. 509-533). Springer, Singapore.
- Rathore, A., Pollentier, I., **Singh, H**., Fallica, R., De Simone, D., & De Gendt, S. (2020). Effect of molecular weight on the EUV-printability of main chain scission type polymers. *Journal of Materials Chemistry C*, 8(17), 5958-5966.
- Shivling, V. D., Sharma, S. K., Ghanshyam, C., **Singh, H**., & Dogra, S. (2015). PLC-Based Sensor and Instrumentation for Crop Disease Forecasting System. *International Journal of Engineering and Innovative Technology* (*IJEIT*), 4(11), 69-73.

TECHNICAL SKILLS

Materials & Fabrication

- MXene and TMDs synthesis
- Thin Film Deposition
- Microfluidic Device Fabrication
- 3D Printing (FDM, SLS, Ink Extrusion)
- Microelectrode Fabrication
- EUV Lithography
- Cleanroom Operations (Class 1 & 1000)

Characterization Techniques

- X-Ray Diffraction Spectroscopy
- Ellipsometry
- UV-Visible Spectroscopy
- FTIR Spectroscopy
- Raman Spectroscopy
- Atomic Force Microscopy
- Scanning Electrochemical Microscopy
- EQCM

Software Proficiency

- MATLAB
- LabVIEW
- OriginLab
- AutoCAD software
- Nova (Metrohm)
- EC-Lab (BioLogic)
- PStrace (PalmSens)
- C/C++ (Arduino)
- PrusaSlicer/Proterface

ACTIVITIES AND HONORS

- **DrEAM Mobility Grant** June - August 2023
  Université de Lorraine, Lorraine Université d'Excellence Initiative (LUE)
  Conducted research at Nanyang Technological University (NTU) Singapore
- **Group meetings organizer | ELAN team, LCMPE-CNRS** 2022 - 2023
- **Industry 4.0 French-German Workshop | Technical University of Kaiserslautern, Germany** 2022
- **MOOC PhD and Career Development | PhDOOC association, France** 2022
- **DeepTech Tour Lorraine** 2022
- **Discover entrepreneurship** 2021
- **Best Paper Presentation Award** March 5 - 6, 2021
  "Engineered MoSe2/WSe2 Based Heterostructures for Efficient Hydrogen Evolution Reaction"
  2nd International Conference on Aspects of Materials Science and Engineering (ICAMSE 2021), Panjab University, Chandigarh, India
- **ERIMEC Scholarship** August 2018 - May 2019
  Awarded by the Director of Teaching & Learning Processes, KU Leuven, Belgium
  For conducting research on photoresist polymers for EUV lithography at IMEC, Belgium

LANGUAGE

English (Fluent) | Hindi (Fluent | Punjabi (Fluent) | French (Basic)