

# 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	Characterization Techniques	Software Proficiency
<ul style="list-style-type: none"><li>• Thin Film Deposition</li><li>• Microfluidic Device Fabrication</li><li>• 3D Printing (FDM, SLS, Ink Extrusion)</li><li>• Microelectrode Fabrication</li><li>• EUV Lithography</li><li>• Cleanroom Operations (Class 1 &amp; 1000)</li></ul>	<ul style="list-style-type: none"><li>• X-Ray Diffraction Spectroscopy</li><li>• Ellipsometry</li><li>• UV-Visible Spectroscopy</li><li>• FTIR Spectroscopy</li><li>• Raman Spectroscopy</li><li>• Atomic Force Microscopy</li><li>• Scanning Electrochemical Microscopy</li><li>• Electrochemical Quartz Crystal Microbalance</li></ul>	<ul style="list-style-type: none"><li>• MATLAB</li><li>• LabVIEW</li><li>• OriginLab</li><li>• AutoCAD software</li><li>• Nova (Metrohm)</li><li>• EC-Lab (BioLogic)</li><li>• PStrace (PalmSens)</li><li>• C/C++ (Arduino)</li><li>• PrusaSlicer/Proterface</li></ul>

## ACTIVITIES AND HONORS

- **DrEAM Mobility Grant** June to August 2023  
Université de Lorraine, Lorraine Université d'Excellence Initiative (LUE)  
Conducted research at Nanyang Technological University (NTU Singapore).
- **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
- **ERIMEC Scholarship** August 20, 2018 - May 31, 2019  
Awarded by the Director of Teaching & Learning Processes, KU Leuven, Belgium  
For conducting research on photoresist polymers for EUV lithography at IMEC, Belgium
- **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

## LANGUAGE

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