

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

ACTIVITIES AND HONORS

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| <ul style="list-style-type: none">• DrEAM Mobility Grant Université de Lorraine, Lorraine Université d'Excellence Initiative (LUE) Conducted research at Nanyang Technological University (NTU Singapore)• Best Paper Presentation Award “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 Awarded by the Director of Teaching & Learning Processes, Leuven, Belgium Representative of recognized higher education institutions under federal or regional law• Group meetings organizer ELAN team, LCMPE-CNRS• Industry 4.0 French-German Workshop Technical University of Kaiserslautern, Germany• MOOC PhD and Career Development PhDIOC association, France• DeepTech Tour Lorraine• Discover entrepreneurship | <div>June to August 2023</div> <div>March 5-6, 2021</div> <div>August 20, 2018 - May 31, 2019</div> <div>2022-2023</div> <div>2022</div> <div>2022</div> <div>2022</div> <div>2021</div> |
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LANGUAGE

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