

Dr. Sahel Fajal

Postdoctoral Researcher

Institut Català de Nanociència i Nanotecnologia (ICN2)

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Research Highlights:

- Design, syntheses and characterization of Advanced Functional Porous Materials (AFPMS), such as Metal-Organic Frameworks (MOFs) and Covalent Organic Frameworks (COFs) for energy-efficient chemical separation applications.
- Development of custom-made Advanced Functional Porous Materials (AFPMS) for selective sequestration and recognition properties, in particular for toxic chemicals segregation and identification.
- Development of rationally designed hybrid composite porous materials for effective sequestration of various chemicals, particularly those fostering environmental sustainability.
- Analyses of structural features and tuning textural/electronic characteristics of AFPMS for application on demand.
- Fabrication of tailored shapeable porous materials (such as macroscopic aerogel, thin-film and membranes) for target specific sequestration of environmentally toxic pollutants.

Positions & Education:

- Postdoctoral Researcher (2024 – Current)

Project Investigator: **Prof. Daniel Maspoch**

Institut Català de Nanociència i Nanotecnologia (ICN2), Bellaterra, Barcelona, Spain

- Doctor of Philosophy (Ph.D.) (2017 – 2023)

Thesis Supervisor: **Prof. Sujit K. Ghosh**

Indian Institute of Science Education and Research (IISER), Pune

- Master of Science (Chemistry) (2014 – 2016)
Aligarh Muslim University (AMU), India
- Bachelor of Science (Chemistry) (2011 – 2014)
Aligarh Muslim University (AMU), India

Selected Research Publications:

1. Sahel Fajal, Atikur Hassan, Writakshi Mandal, Mandar M. Shirolkar, Sumanta Let, Neeladri Das, Sujit K. Ghosh.*
Ordered Macro/Microporous Ionic Organic Framework for Efficient Separation of Toxic Pollutants from Water
Angew. Chem. Int. Ed. 2023, 62, e202214095.
(Selected as Inside Front Cover page)
2. Sahel Fajal, Writakshi Mandal, Samraj Mollick, Yogeshwer D. More, Arun Torris, Satyam Saurabh, Mandar M. Shirolkar, and Sujit K. Ghosh.*
Trap Inlaid Cationic Hybrid Composite Material for Efficient Segregation of Toxic Chemicals from Water
Angew. Chem. Int. Ed. 2022, 61, e202203385.
(Selected as Hot Article & Front Cover page)
3. Sahel Fajal, Writakshi Mandal, Arun Torris, Dipanjan Majumder, Sumanta Let, Mandar M. Shirolkar, Sujit K. Ghosh.*
Nano-snare Implanted Ultralight Crystalline Hybrid Composite Material for Multiple Cooperative Interactions Mediated Efficient Sequestration of Radioiodine
Nature Communication 2024, 15, 1278.
4. Sahel Fajal, Subhajit Dutta and Sujit K. Ghosh.*
Porous Organic Polymers (POPs) for Environmental Remediation
Materials Horizons 2023, 10, 4083–4138.
5. Sahel Fajal, Writakshi Mandal, Dipanjan Majumder, Mandar M Shirolkar, Yogeshwar D. More and Sujit K. Ghosh.*
Unfolding the Role of Building Units of MOFs with Mechanistic Insight towards Selective Metal Ions Detection in Water
Chem. Eur. J. 2022, 28, e202104175.
6. Sahel Fajal, Dipanjan Majumder, Writakshi Mandal, Sumanta Let, Gourab K. Dam, Mandar M. Shirolkar, Sujit K. Ghosh.*
Unraveling Mechanistic Insights in Covalent Organic Frameworks for Highly Efficient Sequestration of Organic Iodides from Simulated Nuclear Waste
J. Mater. Chem. A, 2023, 11, 26580–26591.

7. Sahel Fajal, Dipayan Ghosh, Writakshi Mandal, Sujit K. Ghosh.*
Preferential Separation of Radioactive TcO_4^- Surrogate from a Mixture of Oxoanions by a Cationic MOF
[*Chem. Commun.*, 2024, 60, 1884-1887.](#)
8. Samraj Mollick, Sahel Fajal, Satyam Saurabh, Dabanjan Mahato and Sujit K. Ghosh.*
Nanotrap Grafted Anion Exchangeable Hybrid Materials for Efficient Removal of Toxic Oxoanions from Water
[*ACS Cent. Sci.* 2020, 6, 9, 1534–1541.](#)
9. Sumanta Let, Gourab K. Dam, Sahel Fajal and Sujit K. Ghosh.*
All Organic Porous Heterogeneous Composite with Antagonistic Sites as Cascade Catalyst for Continuous Flow Reaction
[*Chemical Science*, 2023, 14, 10591–10601.](#)
10. Samraj Mollick, Satyam Saurabh, Yogeshwar D. More, Sahel Fajal, Mandar M. Shirolkar, Writakshi Mandal and Sujit K. Ghosh.*
Benchmark uranium extraction from seawater by an ionic macroporous metal-organic framework
[*Energy Environ. Sci.*, 2022, 15, 3462–3469.](#)
11. Writakshi Mandal, Sahel Fajal, Samraj Mollick, Mandar M. Shirolkar, Yogeshwar D. More, Satyam Saurabh, Debanjan Mahato and Sujit K. Ghosh.*
Unveiling the Impact of Diverse Morphology of Ionic Porous Organic Polymers with Mechanistic Insight on the Ultrafast and Selective Removal of Toxic Pollutants from Water
[*ACS Appl. Mater. Interfaces* 2022, 14, 20042–20052.](#)
12. Writakshi Mandal, Sahel Fajal, Partha Samanta, Subhajit Dutta, Mandar M. Shirolkar, Yogeshwar D. More and Sujit K. Ghosh.*
Selective and Sensitive Recognition of Specific Types of Toxic Organic Pollutants with a Chemically Stable Highly Luminescent Porous Organic Polymer (POP)
[*ACS Appl. Polym. Mater.* 2022, 4, 11, 8633–8644.](#)
13. Yogeshwar D. More, Samraj Mollick, Satyam Saurabh, Sahel Fajal, Michele Tricarico, Subhajit Dutta, Mandar M. Shirolkar, Writakshi Mandal, Jin-Chong Tan,* and Sujit K. Ghosh.*
Nanotrap Grafting in the Microenvironment of a Stable Ultramicroporous Anionic MOF for Efficient Uranium Extraction from Seawater
[*Small* 2023, 2302014.](#)
14. Subhajit Dutta, Yogeshwar D. More, Sahel Fajal, Writakshi Mandal, Gourab K. Dam and Sujit K. Ghosh.*
Ionic Metal-Organic Frameworks (iMOFs): Progress and Prospects as Ionic Functional Materials
[*Chem. Commun.*, 2022, 58, 13676–13698.](#)

15. Sahel Fajal, Partha Samanta, Subhajit Dutta and Sujit K. Ghosh.*
Selective and sensitive recognition of Fe³⁺ ion by a Lewis basic functionalized chemically stable metal-organic framework (MOF)
Inorganica Chimica Acta 2019, 502, 1193592.
16. Samraj Mollick, Tarak Nath Mandal, Atanu Jana, Sahel Fajal and Sujit K. Ghosh.*
Hybrid blue perovskite@metal-organic gel (MOG) nanocomposite: simultaneous improvement of luminescence property and stability
Chemical Science, 2019, 10, 10524–10530.
17. Samraj Mollick, Tarak Nath Mandal, Atanu Jana, Sahel Fajal, Aamod V. Desai and Sujit K. Ghosh.*
Ultrastable Luminescent Hybrid Bromide Perovskite@MOF Nanocomposites for the Degradation of Organic Pollutants in Water
ACS Appl. Nano Mater., 2019, 2, 1333–1340.

Academic Distinctions and Fellowships:

- International Travel Grant (2023) by Department of Science & Technology, Science and Engineering Research Board (DST-SERB), India.
- DST-INSPIRE Research Fellowship (2017) by Department of Science & Technology, India (DST/INSPIRE/03/2016/001694).
- Qualified UGC-CSIR National Eligibility Test (NET) for JRF (2017) and SRF (2019).
- Qualified Graduate Aptitude Test in Engineering (GATE) (2017).
- University Second Position in Master of Science (Chemistry) from Aligarh Muslim University in 2016.

Awards and Honors:

- **Best Oral Presentation Award** for the talk on “Trap Inlaid Cationic Hybrid Composite Material for Efficient Segregation of Toxic Chemicals from Water” in DAE-BRNS sponsored 10th Biennial Symposium on Emerging Trends in Separation Science and Technology (SESTEC-2022) organized by Institute of Chemical Technology (ICT), Mumbai, India. November 22-26, 2022.
- **Best Poster Presentation Award** by American Chemical Society (ACS) in Low Dimensional Materials Conference (LDM-2022) organized by Indian Institute of Science Education and Research, Pune, India. May 19-20, 2022.
- **Best Poster Presentation Award** by Royal Society of Chemistry (RSC) in SPSI-MACRO-2022 Conference: Science and Technology of Polymers and Advanced Materials through Innovation, Entrepreneurship and Industry organized by CSIR National Chemical Laboratory (CSIR-NCL), Pune, India. November 02-04, 2022.
- **Best Poster Presentation Award** by American Chemical Society (ACS) in Modern Trends in Inorganic Chemistry (MTIC XIX) organized by Banaras Hindu University, Banaras, India. December 15-17, 2022.
- **Best Poster Presentation Award** by American Chemical Society (ACS) in Chemical Research Society of India 30th National Symposium in Chemistry (CRSI NSC-30) organized by Department of Chemistry, Jawaharlal Nehru University, Delhi, India. February 02-05, 2023.

Technical Skills:

Characterization Technique Used:

Single crystal diffraction data analysis (Bruker Apex II Duo and Bruker D8 Venture Duo), Powder X-ray analysis (BrukerNonius Smart Apex II), UV-visible and Fluorescence spectrometers, MALDI-TOF, ESI-HRMS, ¹H and ¹³C NMR spectroscopy on 400 and 500 MHz instruments, solid state ¹³C NMR spectroscopy, Raman spectroscopy, FT-IR spectrometer, FESEM, TEM or HRTEM, DLS, Zeta potential, TGA and DSC, XPS, Adsorption data from BEL-MAX/BEL-Aqua (Bel Japan), Isothermal calorimetry (ITC), X-ray 3D computed tomography, ICP-AES, ICP-MS.

Synthetic Techniques:

Crystallization techniques, organic, inorganic and material synthesis, polymer synthesis, nanoparticle synthesis, hybrid composite synthesis, fabrication of aerogel, thin-film and membrane.

Equipment Handling:

Single crystal diffractometer (Bruker Apex II Duo and Bruker D8 Venture Duo), Powder X-ray diffractometer (Bruker Nonius Smart Apex II), UV-visible and Fluorescence spectrometers, ¹H, ¹³C and solid-state NMR on 400/500 MHz NMR instruments, FT-IR spectrometer (Perkin Elmer, Thermo, Bruker), Thermogravimetric analysis (TGA), Critical Point Drying (CPD), Zeta potential, DLS, Isothermal calorimetry (ITC), Bel-Sorp instrument for surface area calculation, etc.

Software:

ChemDraw, MestreNova, Mercury, Discovery Studio, Adobe Photoshop, Blender, Shade, 3D Max, Apex-2 and Apex-3, Apex 4 Shelx.

Professional Experience:

ASIAN PAINTS Pvt. Ltd.

Officer-level-I Dept. EHS & QA (Environment Health Safety & Quality assurance) of Asian Paints Pvt. Ltd. (Kasna, Noida, UP, India) From 01-October -2016 to 01-June-2017.

M.I Industries Pvt. Ltd.

Assistant Chemist in M.I Industries Pvt. Ltd. Textile Manufacturing Plant (Noida-UP, India). From 01-June -2016 to 01-October-2016.

Teaching and Monitoring Experience:

- Teaching Assistant to undergraduate students for the courses “Transition Metal Chemistry” (CHM322) at the Indian Institute of Science Education and Research (IISER), Pune.
- Teaching Assistant to undergraduate students for the courses “Chemistry II– Inorganic Chemistry” (CHM201) at the Indian Institute of Science Education and Research (IISER), Pune.
- Teaching Assistant to undergraduate students for the laboratory course “Chemistry Laboratory I – Physical Chemistry” (CHM121) at the Indian Institute of Science Education and Research (IISER), Pune.

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