

SUDIP SHARMA

PhD Researcher in CO₂ Capture & Process Systems Engineering

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📍 Trondheim, Norway

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PROFILE

PhD researcher in process systems engineering at NTNU, building open-source first-principles models of next-generation CO₂ capture and coupling them with machine-learning surrogates and multi-objective optimisation. Backed by three years of industrial process R&D and quality-control experience and an Erasmus Mundus MSc in techno-economic analysis, life-cycle assessment and analytical chemistry.

EDUCATION

PhD (Electrification of Chemical Industries)

Norwegian University of Science and Technology (NTNU)

📅 Oct 2024 – Sep 2027 📍 Trondheim, Norway

Supervisor: Prof. Thomas Alan Adams II (Process and Power group). Modelling, simulation and optimisation of electrified CO₂-capture processes in the open-source python framework, with a focus on Magnetic Inductive Swing Adsorption (MISA).

Erasmus Mundus M.Sc. in Biological & Chemical Engineering for Sustainable Bioeconomy (BIOCEB)

URCA (FR), TalTech (EE), ULiège (BE), TU Graz (AT)

📅 Sep 2022 – Aug 2024 📍 Europe

Thesis (defended at TU Graz under Prof. V. Hacker): coupled techno-economic & life-cycle assessment of polyaniline-coated Pt/C catalysts for PEMFC electrodes. Recycled-Pt sourcing cut cradle-to-gate global-warming impact by about 79% (47.2 to 9.8 kg CO₂-eq per g catalyst) vs. South-African Pt.

B.E. in Chemical Engineering

Kathmandu University (KU)

📅 Aug 2015 – Oct 2019 📍 Kathmandu, Nepal

EXPERIENCE

Research Assistant (M.Sc. Thesis)

Graz University of Technology (TU Graz)

📅 Jan 2024 – Sep 2024 📍 Graz, Austria

- Built a coupled TEA + cradle-to-gate LCA (OpenLCA, ecoinvent v3.10, ReCiPe 2016) of two PANI-coated Pt/C production routes for PEMFC MEAs
- Found the Pt precursor dominates cost (about 33% of about € 59/g) and that recycled-Pt sourcing cuts global-warming impact by about 79% vs. primary South-African Pt

DOCTORAL RESEARCH

Magnetic Inductive Swing Adsorption for CO₂ Capture

NTNU, Process and Power

📅 Oct 2024 – Present 📍 Trondheim

- Developed a validated open-source MISA model in IDAES/Pyomo, extending the FixedBed1D class with Specific Absorption Rate based electromagnetic-heating physics for an Fe₃O₄@HKUST-1 adsorbent
- Fitted and validated against adsorbent isotherm, breakthrough and desorption data: breakthrough within 9%, peak temperature within 5%
- Gaussian-process surrogates with multi-objective optimisation (purity, recovery, productivity, energy) for cycle design and TSA/PSA techno-economic comparison
- Funded by the NTNU-MIT Energy Research Programme (NMERP-C2)

PUBLICATIONS

Sharma, Sudip and Thomas Alan Adams II (2026). "An open-source IDAES framework for simulating inductively heated adsorption processes". In: *Systems & Control Transactions*. European Symposium on Computer Aided Process Engineering. (in press). Sheffield, UK. DOI: 10.69997/sct.177673.

Shrestha, Rakesh, Sagar Ban, Sijan Devkota, **Sudip Sharma**, Rajendra Joshi, Arjun Prasad Tiwari, Hak Yong Kim, and Mahesh Kumar Joshi (Aug. 1, 2021). "Technological trends in heavy metals removal from industrial wastewater: A review". In: *Journal of Environmental Chemical Engineering* 9.4, p. 105688. ISSN: 2213-3437. DOI: 10.1016/j.jece.2021.105688.

TECHNICAL SKILLS

IDAES & Pyomo

Python

Gaussian-Process Surrogates

Active Learning

Multi-objective Optimisation

Process Modelling & Simulation

TEA & LCA

OpenLCA & ecoinvent

HPLC

FTIR

GC-MS

AWARDS



Erasmus Mundus Scholarship
European Union (2022–2024)



Diligent Student Scholarship
Kathmandu University (2016–2019)

- Ran electrocatalysis characterisation (RDE, SEM, FTIR) of the Pt/C catalyst

Executive Engineer (R&D and Quality Control)

Jawalakhel Group of Industries

📅 2019 – 2022

📍 Lalitpur, Nepal

- Ran quality control and analytical testing of raw materials and finished products
- Supported process R&D and product development on the plant floor

CONFERENCE CONTRIBUTIONS

ESCAPE-36

European Symposium on Computer Aided Process Engineering

📅 21–24 Jun 2026

📍 Sheffield, UK

First-author paper (in press): open-source IDAES MISA model validated against experimental isotherm, breakthrough and desorption data (breakthrough within 9%, peak bed temperature within 5%).

CHISA 2026

28th Int. Congress of Chemical & Process Engineering

📅 23–27 Aug 2026

📍 Prague, Czech Republic

Poster presentation on the MISA process model.

SIMS 2026

67th Conf. of the Scandinavian Simulation Society

📅 16–17 Sep 2026

📍 Eskilstuna, Sweden

Discussion paper on the MISA process model.

LANGUAGES

Nepali (native)



English



Norwegian



LEADERSHIP



Founding Secretary

KU Circle of Noble Chemineers (KUCONC)

Organised technical seminars and project demonstrations for 50+ chemical engineering students.

REFERENCES

Prof. Thomas Alan Adams II

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Prof. Viktor Hacker

@ TU Graz

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