

Henrik Eliasson

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About Me

I am a researcher in AI for scientific applications, focusing on computer vision applied to microscopy data. During my doctoral work, I developed automated processing techniques for high-resolution scanning transmission electron microscopy to study catalyst nanoparticles, including generative frameworks such as GANs and diffusion models. My main research interest is methodology development for quantitative and automatable workflows that enable new types of experiments.

Work Experience

- **Postdoctoral Researcher** 2025–
VISION – Center for Visualizing Catalytic Processes
Technical University of Denmark
- **Doctoral Researcher** 2021–2025
Electron Microscopy Center
Empa – Swiss Federal Laboratories for Materials Science and Technology
- **Process Engineer** 2021–2021
SweGaN AB

Education

- **PhD – Materials Science** 2021–2025
ETH Zürich, Switzerland
Thesis: *Quantitative Electron Microscopy of Catalytic Clusters*
- **MSc – Applied Physics and Electrical Engineering** 2016–2021
Linköping University, Sweden
Thesis: *Modeling of Carbon Plasma Discharges in High-Power Impulse Magnetron Sputtering*

Skills

- **Software:** Python, C++, PyTorch, Hydra, Git, TensorBoard, Adobe Suite, AI tools (e.g. GitHub Copilot), Data Curation, Modelling.
- **Transmission Electron Microscopy:** TEM/STEM, EDX, EELS, Gas-cell microscopy
- **Scientific Communication:** Excellent Technical Writing Skills (6 Peer-Reviewed First Author Publications), Presentations at 5 International Conferences(1 Invited).

- **Project Leadership & Strategy:** End-to-End Research Project Management, Strategy and Experimental Design, Identifying and Initializing Cross-Disciplinary Collaboration, Mentoring.

Conference Presentations & Activities

- **Invited oral presentation** @ VISION - DTU, Copenhagen, Denmark Oct. 2025
Computer vision techniques for the atomic-scale analysis of catalyst nanoparticles
- **Oral presentation** @ MC2025, Karlsruhe, Germany Sep. 2025
Catalyst nanoparticle size-prediction with generative AI and big data
- **Invited oral presentation** @ LWS2025, Klosters, Switzerland Feb. 2025
Towards atomically precise nanoparticle size estimation by HR-STEM and generative AI
- **Oral presentation** @ EMC2024, Copenhagen, Denmark Aug. 2024
Nanoparticle size estimation by HR-STEM and generative AI
- **Oral presentation** @ M&M2024, Cleveland, USA Jul. 2024
Exploring Structural Dynamics of Small Pt Nanoparticles on Ceria
- **140th International Summer Course** @ BASF, Ludwigshafen, Germany Aug. 2023
- **Oral presentation** @ SCANDEM 2023, Uppsala, Sweden Jun. 2023
Dimensionality control of Pt on CeO₂ through support interaction

Publications

First author:

- **Tracking Dynamics of Supported Indium Oxide Catalysts in CO₂ Hydrogenation to Methanol by In Situ TEM**
H. Eliasson, Y.-T. Chiang, T. Pinheira Araújo, X. Li, R. Erni, S. Mitchell, and J. Pérez-Ramírez
Advanced Materials, **2025**, [[Article](#)]
- **Improving Nanoparticle Size Estimation from Scanning Transmission Electron Micrographs with a Multislice Surrogate Model**
H. Eliasson and R. Erni
Nano Letters, **2025**, [[Article](#)]
- **Precise Size Determination of Supported Catalyst Nanoparticles via Generative AI and Scanning Transmission Electron Microscopy**
H. Eliasson, A. Lothian, I. Surin, S. Mitchell, J. Pérez-Ramírez, and R. Erni
Small Methods, **2024**, [[Article](#)]

- **Localization and segmentation of atomic columns in supported nanoparticles for fast scanning transmission electron microscopy**
H. Eliasson and R. Erni
npj Computational Materials, **2024**, [[Article](#)]
- **Support-facet-dependent morphology of small Pt particles on ceria**
H. Eliasson, Y. Niu, R.E. Palmer, H. Grönbeck, and R. Erni
Nanoscale, **2023**, [[Article](#)]
- **Modeling of high power impulse magnetron sputtering discharges with graphite target**
H. Eliasson, M. Rudolph, N. Brenning, H. Hajihoseini, M. Zanáška, M. J. Adriaans, M. A. Raadu, T. M. Minea, J. T. Gudmundsson, and D. Lundin
Plasma Sources Science and Technology, **2021**, [[Article](#)]

Collaborations:

- **Descriptors of InZrO_x vs ZnZrO_x Catalysts for CO₂ Hydrogenation to Methanol**
T. Zou, E. Tazedaki, K. M. Engel, Y.-T. Chiang, M. Agrachev, K. Raue, F. Krumeich, H. Eliasson, R. Erni, W. J. Stark, R. N. Grass, T. Pinheiro Araújo, and J. Pérez-Ramírez
Advanced Energy Materials, **2025**, [[Article](#)]
- **Growth and mobility of copper in industrial Cu/ZnO/Al₂O₃ hydrogenation catalyst investigated by in situ gas-cell scanning transmission electron microscopy**
X. Li, H. Eliasson, W. Dachraoui, and R. Erni
Applied Surface Science, **2025**, [[Article](#)]
- **Mechanochemically-derived iron atoms on defective boron nitride for stable propylene production**
G. M. Beshara, I. Surin, M. Agrachev, H. Eliasson, T. Otroshchenko, F. Krumeich, R. Erni, E. V. Kondratenko, and J. Pérez-Ramírez
EES Catalysis, **2024**, [[Article](#)]
- **Consumer Grade Polyethylene Recycling via Hydrogenolysis on Ultrafine Supported Ruthenium Nanoparticles**
S. D. Jaydev, A. J. Martín, M.-E. Usteri, K. Chikri, H. Eliasson, R. Erni, and J. Pérez-Ramírez
Angewandte Chemie, **2023**, [[Article](#)]
- **Very Low Temperature CO Oxidation over Atomically Precise Au₂₅ Nanoclusters on MnO₂**
X. Wang, J. Zhao, H. Eliasson, R. Erni, A. Ziarati, S. Mckeown Walker, and T. Bürgi
Journal of the American Chemical Society, **2023**, [[Article](#)]
- **Lattice-Stabilized Chromium Atoms on Ceria for N₂O Synthesis**
Q. Yang, I. Surin, J. Geiger, H. Eliasson, M. Agrachev, V. A. Kondratenko,

A. Zanina, F. Krumeich, G. Jeschke, R. Erni, E. V. Kondratenko, N. López,
and J. Pérez-Ramírez
ACS Catalysis, **2023**, [[Article](#)]

- **Reaction-Induced Metal-Metal Oxide Interactions in Pd-In₂O₃/ZrO₂ Catalysts Drive Selective and Stable CO₂ Hydrogenation to Methanol**
T. Pinheiro Araújo, J. Morales-Vidal, G. Giannakakis, C. Mondelli, H. Eliasson,
R. Erni, J. A. Stewart, S. Mitchell, N. López, and J. Pérez-Ramírez
Angewandte Chemie, **2023**, [[Article](#)]
- **Oriented Porous NASICON 3D Framework via Freeze-Casting for Sodium-Metal Batteries**
E. Edison, A. Parrilli, E. Tervoort, H. Eliasson, and M. Niederberger
ACS Applied Materials & Interfaces, **2023**, [[Article](#)]
- **Low-Valent Manganese Atoms Stabilized on Ceria for Nitrous Oxide Synthesis**
I. Surin, Z. Tang, J. Geiger, S. Damir, H. Eliasson, M. Agrachev, F. Krumeich,
S. Mitchell, V. A. Kondratenko, E. V. Kondratenko, G. Jeschke, R. Erni,
N. López, and J. Pérez-Ramírez
Advanced Materials, **2023**, [[Article](#)]

Languages

Swedish (Native), **English** (Fluent), **Norwegian** and **Danish** (Good understanding),
German and **French** (Elementary)