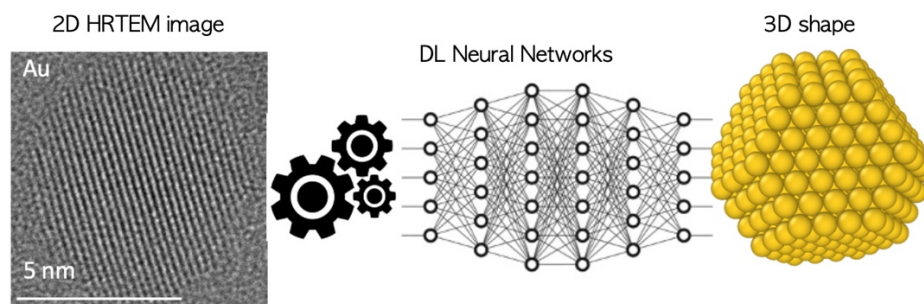


Artificial intelligence in electron microscopy

Exploring new frontiers in materials and life sciences

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The aim of the symposium is to present the state of the art at national level in the use of machine learning (ML) and deep learning (DL) techniques applied to electron microscopy. Transmission electron microscopy (TEM) has become an essential tool in the characterisation of various systems of interest in many fields (materials science, physics, chemistry, life sciences), providing crucial information on the structure of matter as well as on the dynamics of phenomena occurring at scales ranging from the atom to the micrometer. Recent advances have made it possible to generate large quantities of data in a wide range of operating modes and observation conditions (in situ, atomic resolution, etc.). These advantages make it easier to obtain statistically significant results and to study a large number of relevant mechanisms, making the data acquisition and processing stages complex and time-consuming.



This mini-symposium takes up this challenge and aims to discuss the use of ML/DL approaches in electron microscopy by proposing to cover, among other things, recent developments in the following topics:

- Application of ML/DL to the acquisition and analysis of electron microscopy data (3D reconstruction, segmentation, object detection, prediction/extraction of physical/chemical/biological properties) and to the synthetic enhancement of images (denoising, super-resolution).
- Generation, management and optimisation of datasets for ML/DL model training
- Possibility of sharing data and models at national level

The goal is to bring together scientists from physics, chemistry, biology and data science interested in this emerging field of research to share their know-how, strategies and interests. After the success of a [one-day workshop held in 2023](#), which attracted 150 participants (80 of whom attended in person), this conference will provide an opportunity to take an overview of the use of fast-growing ML/DL tools, as well as the new topics being tackled at national level.