

# Hao Chen

Gender M | Date of birth 18/12/1994 | Nationality China

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## Research Profile

Experimental researcher specializing in functional oxides, with expertise and interest in defect chemistry and synchrotron-based electronic structure probes.

## Employment & Education

<b>Postdoctoral Fellow</b> – Department of Physics, Politecnico di Milano, Italy	05/2024–11/2025
<b>Ph.D.</b> in Applied Physics – Department of Physics, Politecnico di Milano, Italy	11/2020–05/2024
Research stay at European Synchrotron Radiation Facility (ESRF), France	09/2022–12/2022
<b>M.Sc.</b> in Materials Engineering and Nanotechnology, Politecnico di Milano, Italy	09/2017–07/2020
<b>B.Sc.</b> in Materials Science and Engineering, Henan Polytechnic University, China	09/2013–06/2017

## Professional Experience

### WO<sub>3-x</sub> Thin Films

- Quantified defect concentrations using EDXS, XPS, and Auger spectroscopy.
- Developed a graded ellipsometry model to resolve depth-dependent dielectric profiles beyond uniform approximations.
- Applied XANES/EXAFS to correlate electronic structure and oxidation states with local coordination and oxygen vacancies.
- Implemented Python-based NNMF analysis to decompose large RIXS datasets and identify hidden spectral components.
- Established SEM/AFM protocols to capture nanoscale morphology and surface roughness.
- Correlated XRD and Raman spectroscopy to resolve amorphous-to-crystalline structural transitions.
- Quantified electrical transport (van der Pauw), linking conductivity to oxygen vacancy defects.
- Probed ultrafast carrier dynamics using transient absorption (pump-probe) spectroscopy.

### SrO/SrIrO<sub>3</sub> Superlattices & High-Entropy Oxide Thin Films

- Optimized PLD growth for epitaxy and interface control in complex oxides.
- Resolved film periodicity and interface sharpness via combined XRD/XRR analysis.
- Validated composition using complementary XPS and SEM-EDXS.

### Solid Oxide Fuel Cell Thin Films

- Performed operando XAS to track real-time electronic & structural evolution under working conditions.
- Developed Python workflows to decouple thermal and chemical effects in operando measurements.

## Research Proposals

Co-authored proposals securing access to major user facilities: ESRF, Elettra Synchrotron, PoliFab.

## Supervision

Co-supervised a M.Sc. student.

## Languages

**English:** C1 – excellent spoken and written proficiency

**Italian:** A2 – basic communication

**Chinese:** native