Curriculum Vitae

Hao Chen

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Research Profile

Experimental physicist specializing in functional oxides, with expertise and interest in optical spectroscopy and synchrotron-based electronic structure probes.

Employment & Education

Postdoctoral Fellow – Department of Physics, Politecnico di Milano, Italy	05/2024–11/2025
Ph.D. 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
M.Sc. in Materials Engineering and Nanotechnology, Politecnico di Milano, Italy	09/2017–07/2020
B.Sc. in Materials Science and Engineering, Henan Polytechnic University, China	09/2013–06/2017

Professional Experience

WO_{3-x} Thin Films

- 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/$SrIrO_3$ 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.

Other Projects

- Participated in RIXS investigations of $GaTa_4Se_8$, GaV_4Se_8 and Na_4IrO_4.

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

Publications

First-author

1. Depth-resolved dielectric function analysis of oxygen-deficient WO_{3-x} thin films via graded Ellipsometric modeling, AIP advances, manuscript under review (2026).
2. Tungsten oxide films by radio-frequency magnetron sputtering for near-infrared photonics, Optical Materials: X, 12, 100093 (2021).
3. Tungsten oxide films for near-infrared photonics and sensing, Proc. SPIE Europe, 12142, 1214205 (2022).
4. Near-IR transparent conductive amorphous tungsten oxide thin layers by non-reactive radio-frequency magnetron sputtering, EPJ Web Conf., 255, 05003 (2021).

Co-authored

5. Plasma sputtered tungsten oxide thin film on Poly (lactic Acid) for food packaging applications, MDPI Coatings, 11(11), 1281 (2021).
6. Plasma deposition to improve barrier performance of biodegradable and recyclable substrates intended for food packaging, Plasma, 5(4), 451–461 (2022).
7. Study of process parameters and characteristic properties of W coatings deposited by rf plasma sputtering, JVST B, 41(3), 032802 (2023).
8. Nature-inspired antibacterial poly (butylene succinate) (PBS) by plasma etching nanotexturing for food packaging applications, Surface & Coatings Technology, 471, 129828 (2023).
9. Amorphous WO_3 as transparent conductive oxide in the near-IR, Proc. SPIE Europe, 12142, 121421J (2022).
10. RF-Sputtering fabrication of flexible glass-based 1D photonic crystals, Proc. SPIE Europe, 12142, 1214206 (2022).
11. Dynamical imaging of local photovoltage at semiconductor surface by photo-assisted ultrafast scanning electron microscopy, EPJ Web Conf., 255, 11001 (2021).

Conference Contributions

Oral

- XAS and RIXS investigation of oxygen vacancy engineering in WO_{3-x} films: from amorphous to crystalline phases, FISMAT, July 2025, Venice, Italy.
- Effect of annealing in air, N_2 and vacuum on the structure of RF-sputtered tungsten oxide thin films, CMD30-FISMAT, September 2023, Milan, Italy.
- Tailorable WO_3 for near-IR photonics and transparent-conductive films, 108° Congresso Nazionale, SIF, September 2022, Milan, Italy.
- Near-IR transparent conductive amorphous tungsten oxide thin layers by non-reactive radio-frequency magnetron sputtering, EOSAM, September 2021, Rome, Italy.

Poster

- Local structure of amorphous and crystalline WO_{3-x} thin films studied by XANES and EXAFS, ESRF user meeting, February 2024, Grenoble, France.
- FTIR characterization of RF-sputtered tungsten oxide thin films for plasmonic applications, CMD30-FISMAT, September 2023, Milan, Italy.
- Amorphous WO_3 as transparent conductive oxide in the near-IR, SPIE photonics Europe, April 2022, Strasbourg, France.