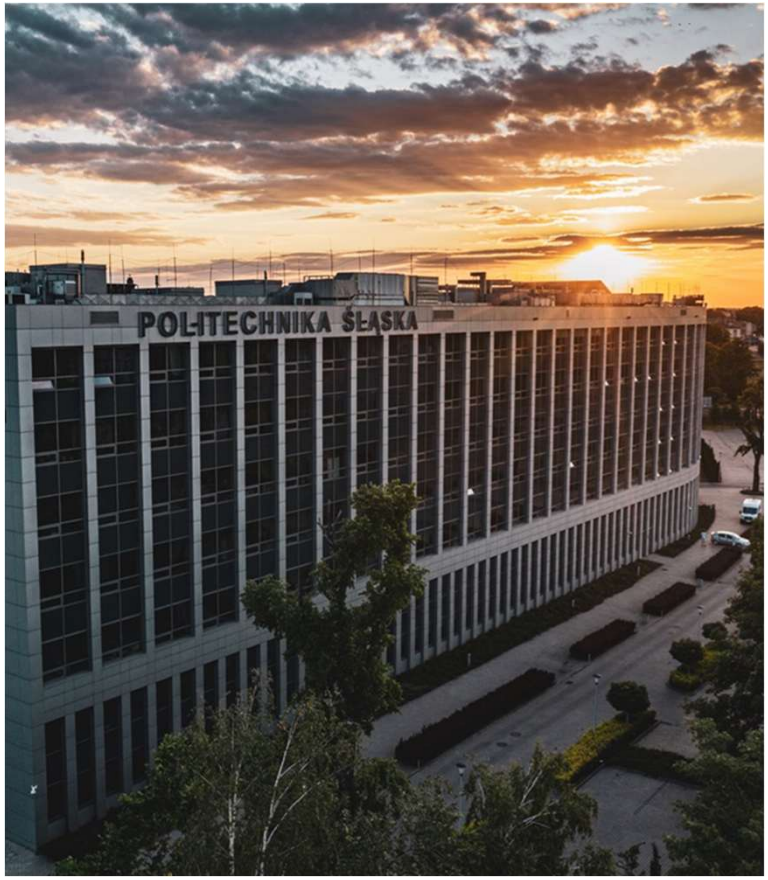
INSTITUTE OF PHYSICS

SILESIAN UNIVERSITY OF TECHNOLOGY

28.01.2026

About us

- **The Institute of Physics** Silesian University of Technology – plays a key role in education and research in applied physics, material engineering, Earth sciences at the University. It is located at CNT, 22B Konarskiego Street, Gliwice.
- **Teaching Activities:** The Institute offers first-cycle engineering studies in technical physics and geoinformatics, covering applied physics, numerical methods, programming, and high vacuum technologies. The program emphasizes practical skills like measurement automation and data analysis, preparing graduates for scientific research and industry.
- **Scientific Research:** The Institute conducts advanced research across specialized divisions, key areas include solid-state physics, applied physics, material engineering and geochronology with environmental isotope studies



More information about Faculty

Students success:

Our students regularly stand on the podium in various sports disciplines such as climbing and mountain biking, and actively participate in scientific groups and conduct research at scientific laboratories of the Institute of Physics

Students scientific groups:

SKN Surface Research and Technology

BOSON CLUB

Silesian Aerospace Technologies

A Group of People Who Like Physics

gamma-FORCE

Studenci Fizyki technicznej na szkoleniu MARAWAS 2024

Studentka Fizyki technicznej – Małgorzata Włodarczyk złotą medalistką we wspinacze

Student Fizyki Technicznej złotym medalistą w Akademickich Mistrzostw Polski w kolarstwie

Nagroda Rektora II stopnia dla inż. Agnieszki Bolik-Głuszek

Structure of the Institute of Physics

There are three divisions at the Institute of Physics:

- **Division of Solid State Physics**
- **Division of Geochronology and Environmental Isotope**
- **Division of Applied Physics**

Managers of internal units

Head of Division of Solid State Physics

Anna Starczewska, PhD hab.

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tel. +48 32 603 4188
40-019 Katowice, Krasińskiego 8/162

Head of Division of Applied Physics

Anna Kaźmierczak-BałataPhD Eng.

email: Anna.Kazmierczak-Balata@polsl.pl
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44-100 Gliwice, Konarskiego 22B/106

Head Division of Geochronology and Environmental Isotopes

Piotr Moska, PhD hab. Eng.

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tel. +48 32 400 26 62
44-100 Gliwice, Konarskiego 22B/205

Division of Solid State Physics

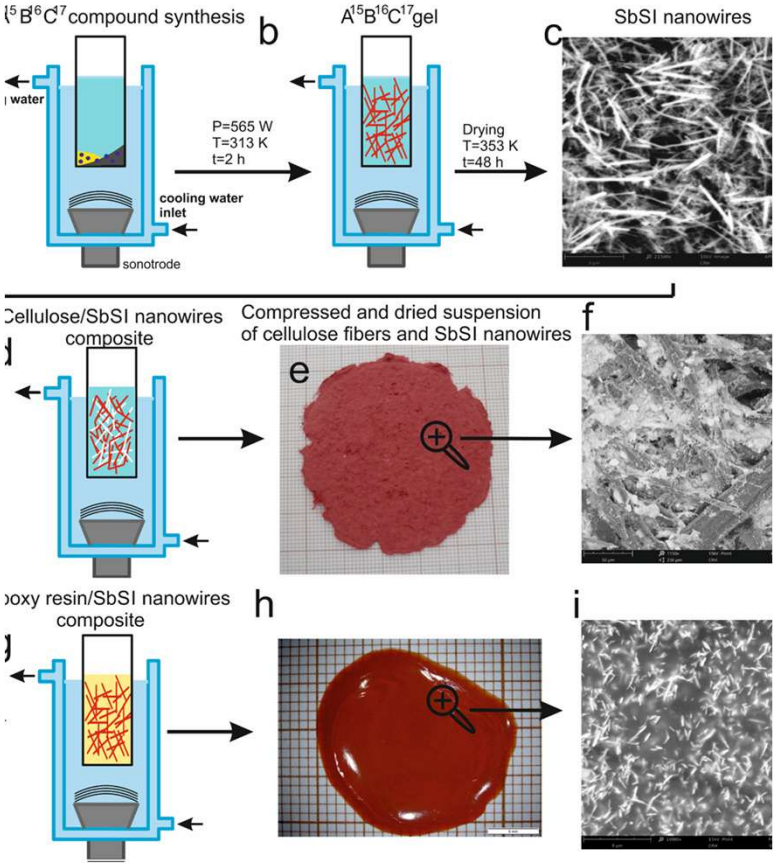
Fabrication of macroscopic crystals, nanomaterials, photonic structures, composite materials, and functional structures in particular, based on chalcohalides and chalcogenides of antimony (Sb), and bismuth (Bi), but not only

Fabrication Methods

- Sonochemical synthesis
- Hydrothermal and solvothermal methods
- Crystal growth from gas phase

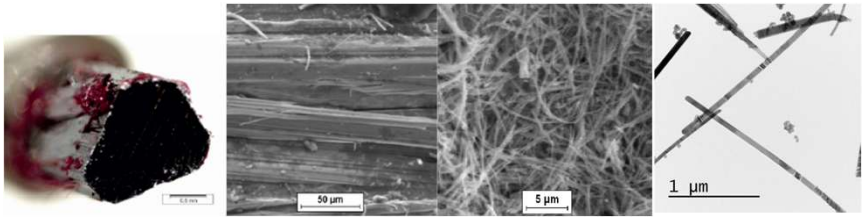
Methods of Combining Nanomaterials into Layered or Bulk Structures

- Spin coating
- High-pressure pressing at room temperature
- Alignment of one-dimensional nanostructures in an electric field

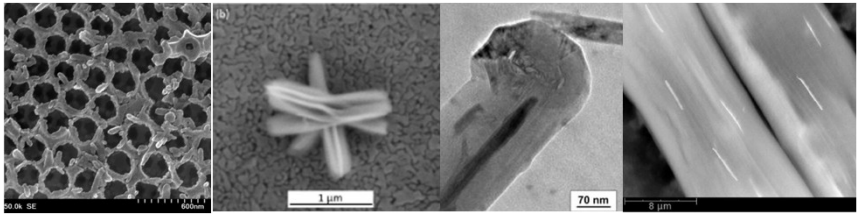


Research offer

Examples of manufactured materials:



- monocrystals SbSI, SbSeI
- textured polycrystals SbSI
- microcrystals BiSCl
- nanowires SbSI, SbSeI, $SbS_{1-x}Se_xI$
- nanoplates BiOI
- nanowires encapsulated in carbon nanotubes, SbSI@CNT, SbSeI@CNT
- hybrid nanomaterials SbSI/graphite, SbSI/graphen, SbSI/TiO_2, SbSI/MoS_2
- nanocomposites PVP/SbSI, PVP/SbSeI, PAN/SbSI, PVDF/SbSI,
- epoxy resin/SbSI, cellulose/SbSI, MWCNT/PDMS
- submicrometric structures Bi_2S_3
- inverse opals SbSI
- piezoelectric nanoparticles ZnO, $BiFeO_3$



Research offer

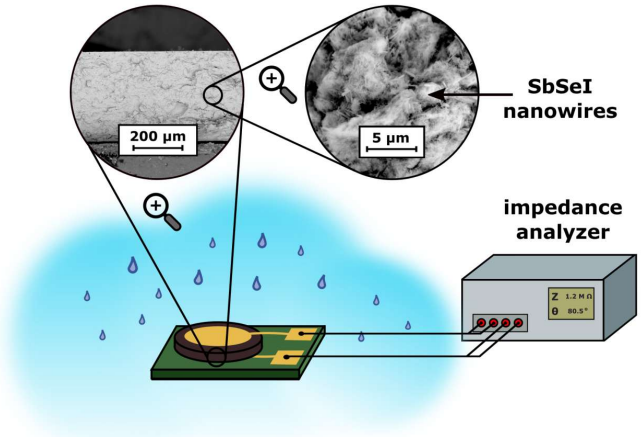
Investigations of the properties:

- morphological and chemical composition – SEM analysis
- optical properties – VIS/NIR transmission and reflection spectroscopy
- electrical and photoelectrical properties – dc measurements & impedance spectroscopy
- piezoelectric & pyroelectric properties
- sensor properties – testing in a climatic chamber
- sono-, piezo-, and photocatalytic properties
- interaction of intense laser radiation and laser surface treatment

Research offer

Searching for applications of manufactured materials:

- Photovoltaic devices
- Gas and humidity sensors
- Self-powered sensors
- Nanogenerators for mechanical energy harvesting and vibration detection
- Nanogenerators for thermal energy harvesting
- Sensors for measuring acoustic power in ultrasonic reactors
- Piezo-, pyro-, and photocatalysis using ferroelectric nanomaterials



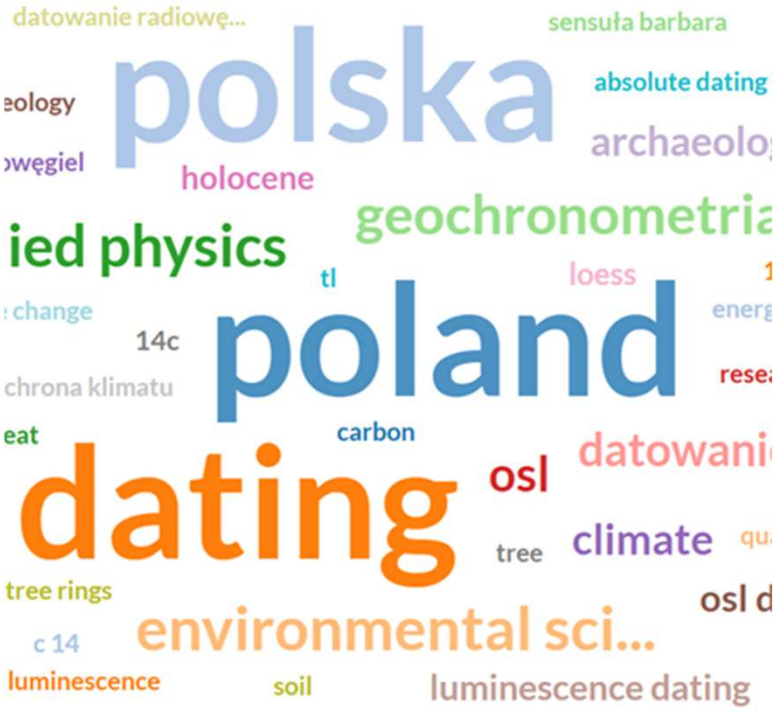
Division of Geochronology and Environmental Isotopes

What do we do?

- research the fundamentals of physical isotope methods and their applications
- engage in interdisciplinary research projects

Why do we do it?

- We apply isotope research techniques to:
- Reconstruct **timescales** of events in Earth's and human history
- Trace natural and anthropogenic **environment and climate** changes
- The outcomes of these studies contribute to
- **Earth sciences** - geology, geomorphology, paleogeography, hydrogeology
- **biological** sciences - paleobotany, dendrochronology, paleozoology
- history, archaeology and anthropology



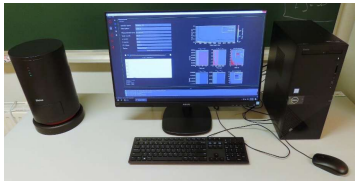
Research offer

- ***How do we do it?***

The Divison houses two unique laboratories:

^{14}C and Mass Spectrometry Laboratory

- **Radiocarbon** measurements with various techniques (LSC, AMS)
- Light **stable isotope** determinations (HCNO) with IRMS
- **Dendrochronology**



Luminescence Dating Laboratory

- **Dosimetric** dating methods (OSL, TL)
- **Radioisotope** measurements (γ and α spectrometry, e.g. ^{137}Cs, ^{210}Pb)

Research offer

Head of the laboratory:
Natalia Piotrowska
natalia.piotrowska@polsl.pl

^{14}C and Mass Spectrometry Laboratory

Tools and throughput

Novel and traditional equipment on site + expertise and know-how

- Chemical labs; vacuum lines; CF-EA; graphitisation equipment, benzene synthesis line
- Beta-ray, IRMS and AMS spectrometers

Ca. 1,500 radiocarbon analyzes per year

Our top research topics

- Methodological studies to improve our tools
- 14C for chronologies

  peat, lake, aeolian, marine sediments; archaeological sites
- Isotope tracing for climate, environment and human impact

  temperature and humidity reconstructions, CO2 emission, past diet, paleozoological studies, migrations

Bio-carbon content evaluation (fuels, packaging, waste…)

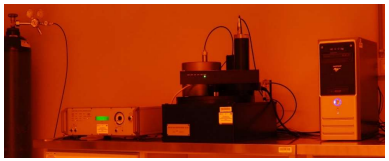
Research offer

Head of the laboratory:
Piotr Moska
piotr.moska@polsl.pl

Luminescence Dating Laboratory

The **Luminescence Dating Laboratory in Gliwice** was established in the early 1980s by **Professors Pazdur and Bluszcz**, who were among the first to publish research on the application of luminescence phenomena in dating methods.

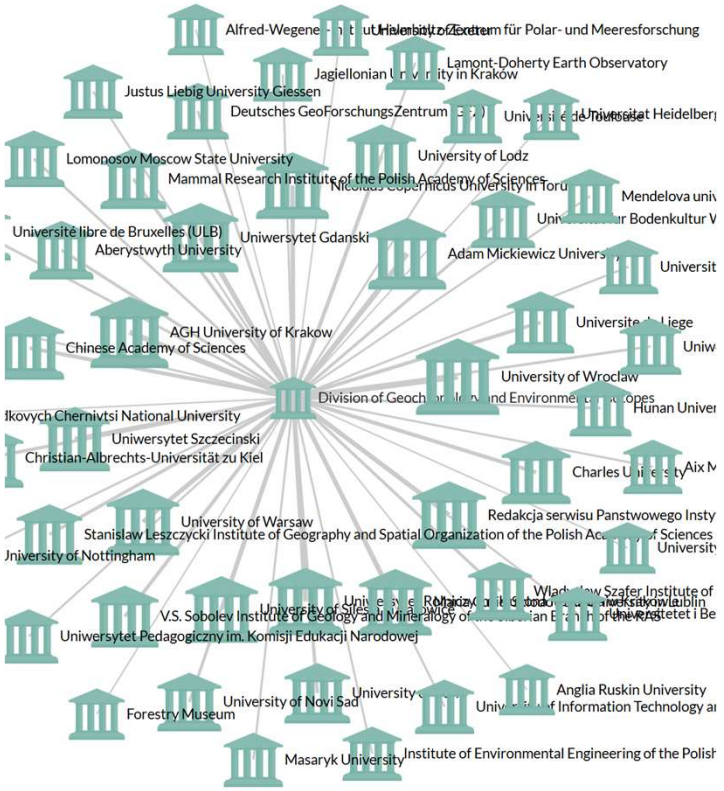
Today, the Gliwice Luminescence Laboratory is **the most advanced facility of its kind in Poland**, conducting research within **national and international projects**. The team **developmed measurement techniques and instrumentation**, like the **µDOSE+ spectrometer**, it was **designed and constructed entirely at the Institute of Physics**.



About us

Division of Geochronology and Environmental Isotopes

- Isotopic and dosimetric measurements carried out in the form of scientific and research work
- Hundreds of analyses per year
- Dozens of domestic and foreign entities per year
- Hundreds of scientists using the research results
- Projects carried out in interdisciplinary national and international scientific cooperation
- Scientific cooperation results in >20 publications per year, mostly in indexed international journals
- Publication of the journal "Geochronometria - journal on methods and applications of absolute chronology", indexed in Web of Science
- Organization of international conferences, workshops, summer schools and active participation in such events



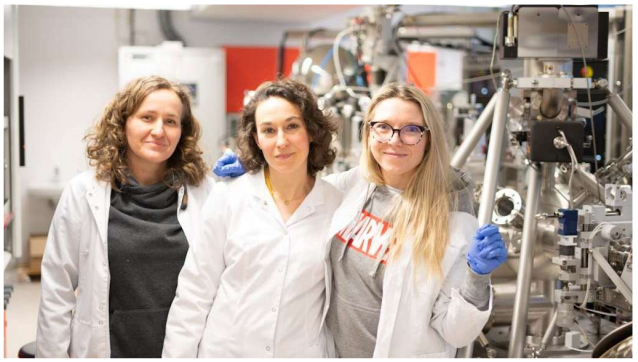
Division of Applied Physics

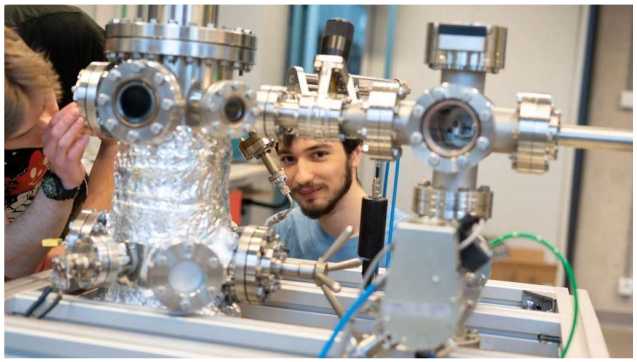
The origins of Division of Applied Physics are in 1971, when the research group "Acoustic methods in semiconductor research" was established at the Institute of Physics at that time. The Division's staff constitutes the human resources of the ESPEFUM laboratory.

The scientific activity of the Division of Applied Physics is focused on :

- development of measurement methods used in materials and environment research,
- fabrication and investigation of nanostructures,
- scaning probe microscopies,
- developing sensors for various substances, e.g. combat gases,
- modeling of electronic devices.

ESpeFuM
Electron Spectroscopy for Functional Materials Laboratory



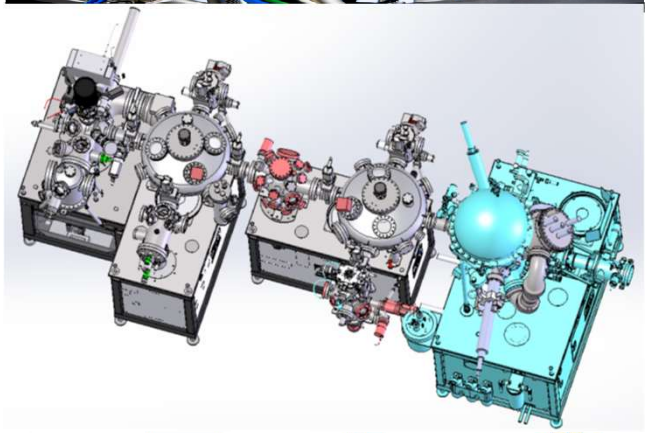


Research offer

Head of the laboratory:
Maciej Krzywiecki (Maciej.Krzywiecki@polsl.pl)

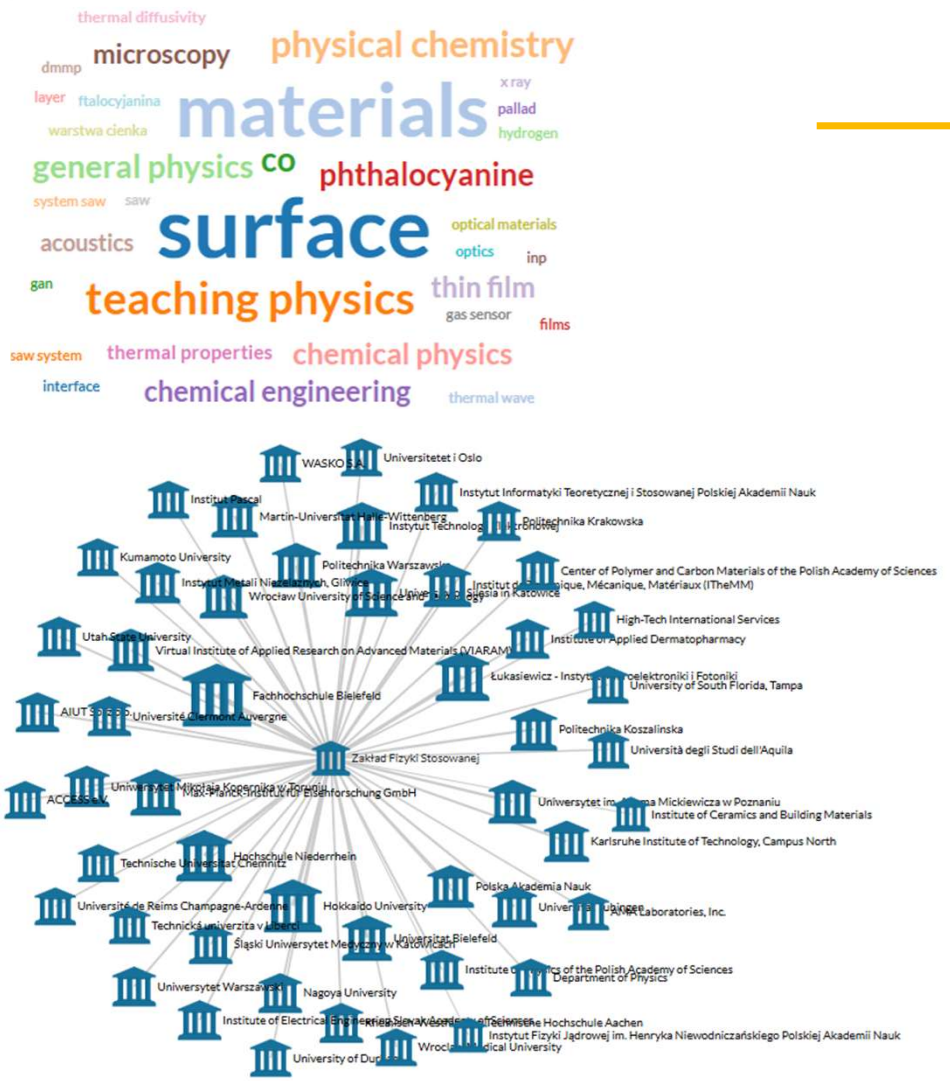
Laboratory of Electron Spectroscopy and Functional Materials (ESpeFuM)

- The laboratory is equipped with unique world-class research equipment:
- X-ray, UV, Auger electron spectroscopies
- Microscopes (electron, optical, scanning probe)
- Material synthesis stations (UHV and "wet" synthesis)
- Determination of properties:
    - sensing
    - luminescent
    - (photo)thermal
    - impedance
- Simulators using finite element method and quantum chemical methods



Fields for collaboration

- Syntesis of nanomaterials
- Chemical and electron properties of materials
- Thermal properties at nanoscale
- Sensing properties: testing of gas sensor structures
- Metal oxide thin films synthesis (e.g. Al, Zn, Sn, Bi…)
- Organic compounds for electronics
- Simulations based on finite element methods
- quantum chemistry simulators (DFT: AMS, QuantumEspresso, Quantum ATK, Scigress)



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