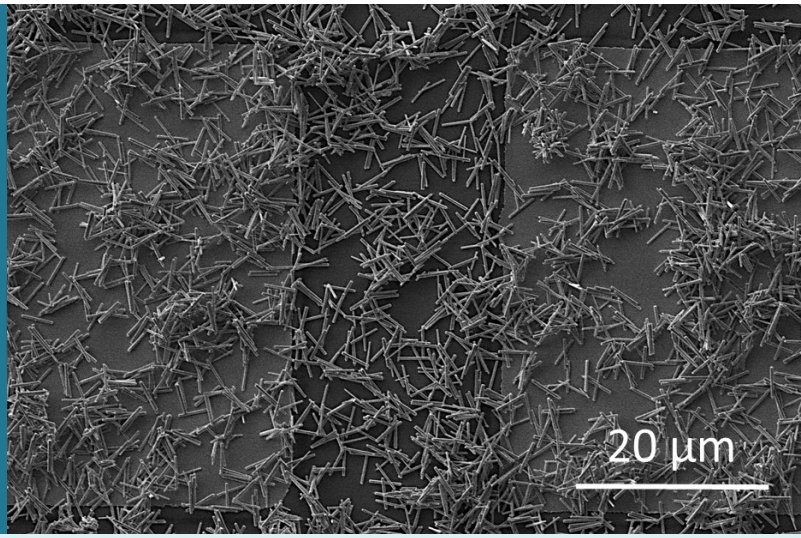
RESEARCH GROUP

https://www.list.lu/en/materials/central-materials-laboratory/group/?tx_listreference_pi1%5BresearchGroup%5D=3&cHash=2afd7598b5f66f849e96d7a46a46af15

Transparent and Optically Tuneable Materials and Nanostructures

With a long-time expertise in transparent conductive oxides, the group is now engaged in the Research and Development on advanced materials and solutions in the areas of functional coatings and devices, addressing applicative issues in Smart surfaces, Nanocomposites, Energy, and Micro-Sensing fields.



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Research Challenges

- Development and engineering of advanced processes for the deposition of thin-films and the synthesis of nano-structured materials
- Understanding and tuning of the electrical and optical properties, catalytic action, and gas permeability of thin-films, multi-layers, nanostructures and nanocomposites
- Integration of functional materials into advanced devices for sensing as well as energy harvesting/storage/catalytic-conversion

Competences

- Thin-film deposition by ALD, CVD, spraying, electroplating
- Micropatterning by ECPR (Electro-Chemical Pattern Replication) and mask-less photolithography
- Material characterizations (Structural, Morphological, Optical, Electrical)
- Electrochemistry
- Electrical conduction in thin-films and nanostructures
- Piezoelectric and piezotronic phenomena
- Energy harvesting and management
- Material modelling by ab-initio and classical approaches
- Multiphysics-multiscale numerical modelling of complex devices

Applicative areas

- Electrochemical, photo-electrochemical, photo-catalytic devices (fuel-cells, water-splitting cells, batteries)
- Advanced gas-barrier protective solutions (packaging)
- Functional glasses with ad-hoc electrical/optical properties
- Ultra-sensitive detection of airborne compounds (gas sensors) and mechanical deformations (strain sensors)
- Edge devices and energy harvesters for Wireless Sensor Networks (WSN) and Internet Of Things (IOT)

Contact
5, avenue des Hauts-Fourneaux
L-4362 Esch-sur-Alzette
phone: +352 275 888 - 1 | LIST.lu

Emanuele BARBORINI
(emanuele.barborini@list.lu)

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST