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## Materials for energy production and storage

Emerging technologies for renewable energy production and storage are the focus on intensive research because of urgently needed enhancements in the efficiency and lifetime of energy devices such as a reduction in the use of materials, cost and environmental impact. The objective of this short course is to present the state of the art of different materials for energy conversion and storage technologies. In this way, the student will know different systems of storage and production of energy in order to acquire capacities that allow him to understand the operation of some of the modern systems of storage and production of electrical energy and the importance that the materials have inside the device.

The first part of the course will be an introduction highlighting the importance of renewable energies in the current energy landscape.

The second part is dedicated to polymeric fuel cells. Proton and anion exchange membrane fuel cells have drawn significant attention as alternative clean energy conversion devices because of their high efficiency, low operating temperature, fast start-up, and their potential to operate with fuels from renewable sources. In these devices, the exchange membrane is an efficiency-determining component, which allows the transport of protons and separates the cell compartment. We will focus on the development of polymeric membranes and the importance of research in this field.

Finally, lithium batteries and the importance of developing additive-free electrodes that lead to safer and more efficient systems will be discussed. In addition, the development of new polymeric solid electrolytes will be presented. All these materials can make it possible to obtain all solid-state batteries.

### Lectures

- Introduction: Renewable energy transition
- PEM Fuel Cells: development of polymeric membranes
- Lithium Batteries: processing of ceramic thick electrodes and synthesis of new polymeric electrolytes

VENUE: Room C12 Edificio Didattica-Facoltà di Ingegneria- Università di Roma Tor Vergata (Via del Politecnico 1, 00133 Roma)

DATE: 9.11.2021 TIME: 11:30 – 13:00

DATE: 10.11.2021 TIME: 14:00 – 15:30

DATE: 11.11.2021 TIME: 14:00 – 15:30