

Subject:	Nanoenergy <i>Nanomaterials and devices for sustainable energy.</i>
Semester:	Spring
ECTS:	2,5
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Department / Faculty:	Department of Electronics Faculty - Physics UB

CONTENTS:

Introduction: Nanomaterials, mesoporous materials and zeolites. Synthesis routes and acquisition methods. Structural and morphological characteristics. Electrical, optical and electrochemical characteristics. Characterization and analysis techniques.

Energy storage: Liquid hydrogen. Physical and chemical gas (hydrogen) absorption in a surface. Measurement techniques. Metallic hydrides, carbonates, Metal Organic Frameworks, MOF, and other large surface materials. Complex hydrides: aluminates and borates. Chemical and kinetic reactions of absorption and desorption. Stability and accumulation capacity. Hydrogen and gas at high pressures. Devices and their proper implementation.

Electrical charge storage: Coulombian blockage in nanostructures. Accumulators. Rechargeable Batteries. Supercapacitors.

Fuel cells: Principles and classification. Low temperature batteries. Medium and high temperature batteries. Electronic, protonic and ionic conduction mechanisms. Materials for electrolytes. Materials for anodes. Materials for cathodes. Catalyst elements. Electrode/electrolyte interphases optimization. Fuel and geometry conditioning. Different kinds of batteries and domestic, industrial and transport applications. Planar technologies and alternatives. Cell montage, isolation and combination. Chemical microreactors and elements integration.

Hydrogen production: Reformed products. Catalysts. Photocatalysis and photolysis of water in nanostructured materials. High temperature processes.

Thermoelectric elements: Thermoelectricity and thermoelectric materials. Structural and morphological dependence in thermoelectrical parameters. Thermoelectricity in nanomaterials. Thermoelectric transformers.

Superconductivity: Superconductive materials. Synthesis and elaboration of superconductive tapes nanostructured based. Applications.

Solar energy: Thin layer technology. Micro and nanocrystalline silicon. CIS. Nanostructured materials and optical absorption. Synthesis processes of nanostructures with absorption profiles. Organic materials and hybrid systems. Advanced photovoltaic cells.

Efficiency, security and environmental control: lightening systems based on field effect in nanostructures. Nanomaterials by thermal isolation. Nanomaterials applications in chemical sensors of liquids and gases. Combustion control.

Practices: Photovoltaic solar energy, Fuel cells