60649 - Advanced Inorganic Materials

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	540 - Master's in Industrial Chemistry
ECTS	3.0
Course	1
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

5.3.Program

1. Batteries

1.1. Characterization of the parameters of batteries.

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1.2. Primary batteries: zinc carbon, alkaline, button, lithium, oxyride. Applications.

1.3. Secondary batteries: lead-acid, nickel-cadmium, nickel-metal hydride, alkaline, lithium. Applications.

1.4. Current and potential applications of batteries: Portable electronic devices. Hybrid and electrical vehicles. Medical applications.

1.5. Causes of battery failure: loss of capacity, increasing internal resistance, self-discharge,

premature disconnection ...

1.6. Disposal / Recycling of batteries: Safety issues and recycling. EU Battery Directive.

Classification. Recycling processes ...

1.7. The future of the batteries.

2. Magnetic Materials

21. Introduction to magnetic materials.

2.2. Microstructure and magnetic domains.

2. 3. Processes of magnetization and magnetization curves.

2.4. Magnetically hard and soft materials.

2.5. Shape anisotropy.

2.6. Magnetic nanoparticles.

2.7. Magnetoresistance.

2.8. Giant and colossal magnetoresistance.

3. Examples of magnetic materials and applications

3.1. Hard magnetic materials: permanent magnets.

3.2. Soft magnetic materials.

3.3. Magnetic storage.

3. 4. Magneto-optical storage.

3.5. Molecular magnets.

4. Surface treatment of metals

4.1. Heat treatments

4.2. Thermochemical treatments

4.3. Electrochemical methods: anodizing, electroplating.

4.4. Chemical passivation.

4. 5. Physical vapor deposition, chemical vapor deposition and ion implantation.

5. Advanced Alloys

5.1. Superalloys.

5.2. Porous metals.

5.3. Shape memory alloys.

5.4. Metallic glasses.

5.5. Metal hydrides.

6. Other advanced materials

5.4.Planning and scheduling

5.5.Bibliography and recomended resources