MATÉRIAUX POLYMÈRES : PROPRIÉTÉS PHYSIQUES ET INNOVATIONS

POLYMER MATERIALS : PHYSICAL PROPERTIES AND INNOVATIONS

Lecturers: Frédéric DUBREUIL

| Lecturers : 12.0 | TC : 12.0 | PW : 4.0 | Autonomy : 4.0 | Study : 0.0 | Project : 0.0 | Language : AN

Objectives

Functional materials, for construction or design, polymer materials also have the possibility of being recycled. Understanding their physical properties as well as better control of their implementation (by 3D printing for example) and their recyclability is the subject of much research.
The physico-chemical and mechanical properties are approached in this course, which also presents concrete cases of innovation in this field. Emphasis will be placed on the life cycle of materials, from implementation to sorting and then recycling. Societal impact of polymers on the environment will be achieved through group work and the production of a

Keywords : thermoplastics, thermosets, elastomers, polysaccharides, proteins, surfaces, synthesis

Programme

General presentation of polymers,
Synthesis of polymers, Characterization and properties of the polymer chain,
Review of major classes of polymers (thermoplastics, thermosets, elastomers)
Physical properties of polymers,
The glass transition temperature and other characteristic temperatures,
Flow and rheology of polymers,
Shaping and recycling,
Natural polymer materials and major fields of application,
Wood and natural fibers, starch, Proteins

Learning outcomes

- Establish correlations between the physical-chemistry of polymers and their macroscopic properties Knowledge of the mechanical properties of polymers Know how to select a polymer analysis method Choice for given application the polymer, its treatment and its implementation

Independent study

Objectifs : Analysis of the impact of polymers on the environment
Comparison between the media image of polymers and scientific reality: confrontation of figures and phenomena

Méhodes : Development of a problem related to the theme
Creation of a poster for a group of 4 students
Restitution during a poster session in front of a large audience: scientific, non-scientific

Core texts

Jean-Louis Halary, Francoise Lauprêtre, Lucien Monnerie, *DE LA MACROMOLÉCULE AU MATÉRIAU POLYMÈRE : SYNTHÈSE ET PROPRIÉTÉS DES CHAÎNES*, Belin, 2006
Jean-Louis Halary, Francoise Lauprêtre, Lucien Monnerie *MÉCANIQUE DES MATÉRIAUX POLYMÈRES*, Belin, 2008
Jo Perez*MATÉRIAUX NON CRISTALLINS ET SCIENCE DU DÉSORDRE*, PPUR, 2001

Assessment

Written exam 2h
Pratical Report
Restitution of autonomy