



ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ
ΣΧΟΛΗ ΧΗΜΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

ΕΠΙΤΡΟΠΗ ΣΕΜΙΝΑΡΙΩΝ, Καθηγήτριας Α. Κοκόσης

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ΣΕΜΙΝΑΡΙΟ ΧΗΜΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

Τρίτη 29 Σεπτεμβρίου, 13:00

Αμφιθέατρο Πολυμέσων – Κεντρική Βιβλιοθήκη Ε.Μ.Π.

Dr. Jean-Pierre Celis

Katholieke Universiteit Leuven, Dept. MTM, B-3001 Leuven, Belgium

Dr. Pierre Ponthiaux

Ecole Centrale Paris, Lab LGPM, F-92295, Châtenay-Malabry, France

Joint seminar

Mechanical and electrochemical aspects of tribocorrosion in the case of passivating metallic materials immersed in aqueous solutions

When a sliding contact between metallic materials is immersed in a more or less aggressive environment like polluted ambient air in cities, industrial polluted fields, or in a marine environment, one has to consider aspects of data acquisition on these environments and on the possible modifications induced commonly by chemical and electrochemical reactions at the metal surfaces in contact with an aqueous corrosive environment.

Tribocorrosion is a degradation process, e.g. due to mechanical deformation or cracking, and the wear of metallic surfaces resulting from a combined effect of friction and physicochemical phenomena like oxidation, corrosion, hydrogen embrittlement. Tribocorrosion deals with the study of the nature and the modifications of the friction mechanisms induced by the aggressiveness of the environment and the mechanical loading and aims at answering in a multi-disciplinar approach the relationships between Surfaces-Environment-Sliding Contacts.

In this lecture an overview will be given on the actual insights into the different processes that are active during tribocorrosion, the ways how tribocorrosion can be investigated at lab scale both in-situ and ex-situ. A description of the process of tribocorrosion opens the way to a modeling based on friction and wear laws experimentally determined.

How can tribocorrosion and biotribocorrosion be tested? Description of test protocol and outcome of a Round Robin testing

Tribological and corrosion test procedures are well known and many of these procedures are described in detail in testing standards. Notwithstanding that, the availability of combined corrosion-wear test procedures is still limited. In this presentation, a newly developed test protocol is presented with a special attention on:

- the electrochemical aspects of tribocorrosion,
- the role of surface films on friction and wear during sliding tests performed under immersion in water-based solutions, and
- the synergism in tribocorrosion.

The objective of this test protocol is to allow a fast evaluation of the potential and risks of new materials in sliding contacts operated under wet conditions simulating biological systems. The approach used consists of a combination of electrochemical measurements and sliding tests to decouple material losses originating from corrosion and wear.

The outcome of a recent Round Robin action performed within a COST-action, will be presented to illustrate the applicability of this protocol on the evaluation of the biotribocorrosion behavior of a CoCrMo-biomaterial in a phosphate buffer solution.