



Laboratoire PPSM – UMR CNRS 8531

Photochimie et Photophysique Supramoléculaires et Macromoléculaires

# Séminaire PPSM

Lundi 18 juin 2018 - 11h00

Auditorium D. Chemla - Bâtiment IDA

## Professeur Frédéric VIDAL

Laboratoire de Physicochimie des Polymères et des Interfaces,  
Université de Cergy Pontoise, France

Invité par : Fabien Miomandre

### «An overview of preparation, properties and applications of Conducting IPN actuators»



In this presentation, the results which have been obtained in Cergy-Pontoise during the last years will be presented. In particular, we will show how the control of the macromolecular architecture makes it possible to fabricate actuators suitable for targeted applications.

The synthesis of electronic conducting Interpenetrating Polymer Networks (IPN) is proposed as an alternative to multilayer architectures for the design of actuators i.e. artificial muscles. The electronic conducting polymer (ECP) poly(3,4-ethylenedioxythiophene) as Electro-Active Polymer is symmetrically distributed in a solid polymer electrolyte (SPE) membrane which combines a poly(ethylene oxide) network and a Nitrile Butadiene Rubber within an IPN macromolecular architecture. The artificial muscle properties are thus determined mainly by the material characteristics: the ECP, the SPE ionic conductivity in the presence of ionic liquid and the mechanical properties of the IPN material.

During the presentation, the synthesis of the artificial muscles will be described first and the actuations performances in bending mode for macro and microactuators will be reported. Moreover, these artificial muscles can behave as mechanical strain sensor. Voltage response has been observed when a mechanical stimulus is applied and the amplitude of the electrical response depends on the electrolyte composition.

Since the polymer chemistry allows tailoring the material's physico-chemical properties and its shape, actuators with particular properties can be designed. Results on active catheters, active fiber mats or actuators combining electroactive polymers and shape memory polymer will be presented.

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