

DIRECTION DES SCIENCES DE LA MATIÈRE,
INSTITUT RAYONNEMENT MATIÈRE DE SACLAY

SERVICE DE PHYSIQUE ET DE CHIMIE DES SURFACES ET DES INTERFACES

SEMINAIRE *

Lundi 24 octobre 2011 à 11h00

Bâtiment 466, salle 111 - CEA Saclay, 91191, Gif sur Yvette

Photo-mechanical effect in azo polymers: energy harvesting to mechanic

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Polymers containing Azobenzene chromophores have received much interest as photo-reversible materials for a variety of energy harvesting and transducing applications. Most recently, Azo Polymers that mimic the retinal photo-switch that enables vision have also been shown to respond physically and mechanically to light, to act as all-optical patterning materials, and simple photo-mechanical devices, where solar energy can be converted directly to mechanical work. In particular, a photo-induced pressure in soft amorphous thin films of azo polymers can lead to the facile inscription of various nanostructures, and efficient surface relief gratings (SRGs) upon irradiation with an interference pattern. Reversible changes in surface energy are also inducible as a result, for a variety of biomedical applications, such as guiding cell growth and function reversible and remotely via light.

Irradiation with CW light will be shown to lead to a measurable reversible photo-expansion of these films, of up to a few %, allowing the materials to function as photo-mechanical switches or light-actuators. New azo polymers to optimize this effect will be presented, and some simple macroscopic devices will be demonstrated that take mechanical advantage of this effect for larger scale motion driven by sunlight, such as bending, rolling, and 'walking'. The mechanism for this effect will be discussed from studies using ellipsometry, light-bending of AFM cantilevers, surface plasmon resonance spectroscopy, and neutron reflectometry.

*** SERA PRECEDE D'UNE PAUSE-CAFE A PARTIR DE 10H30**

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