LaMCoS Unité Mixte de Recherche 5259

Laboratoire de Mécanique des Contacts et des Structures

Design and Study of Nano-structured multi-responsive surfaces for reversibly tuning Surface Properties.

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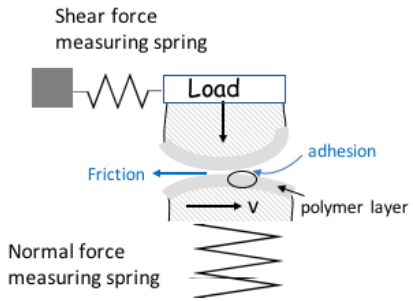

Fig.1: Surface Forces measurement set-up

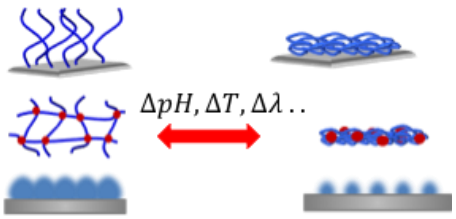

Fig.2: Nanostructured stimuli-responsive coatings

A number of experimental studies have shown that polymer coatings can be efficiently used to control friction and adhesion between surfaces. Polymer coatings have properties and responsiveness that are contingent on the chemical composition, size and shape of structure, elasticity. However, they are generally suffering from major shortcomings such as lack of responsiveness selectivity and reversibility, poor environmental stability and limited understanding of the structure–function relationship, which are all critical to design reliable rules for building responsive or self-lubricating surfaces. Experimental surface forces studies of different classes of solvated polymer-bearing surfaces carried out using the surface forces apparatus and similar molecular techniques will be presented in order to elucidate the responsiveness mechanism and the structure–property relationship between polymer-coated surfaces in aqueous media. Even though conclusive understanding is still hampered by the difficulty of systematically controlling the grafting density, the studies suggest that the effective lubrication mechanisms involve the facility with which macromolecules under compression remain hydrated and hold a significant amount of water at the surfaces to be lubricated.

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