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Title: *Electro-Responsive Polyelectrolyte-Coated Surfaces*

Localisation: IPREM, 14h

Abstract : Most of the studies in friction control have been devoted to improve lubricant design based on novel chemistry or better formulations, combining engineering, know-how and trial-and-error methods. Customarily, walls are considered as confining inert boundaries, with invariable interactions among themselves and with the lubricants. However, considering the surfaces as active components of the system may open avenues for novel functions; appealing applications can be foreseen if the control of the composition and morphology of the surfaces can be tuned in a reasonable time scale. Polyelectrolytes are convenient elementary bricks to build responsive surfaces, given that the polyion chain conformation is very sensitive to different environmental variables. Thus, the state of a typical polyelectrolyte can be controlled by external stimuli or environmental changes, allowing for reversible modifications of the intimate structure of the surface. In this way, active control of the surface properties is possible by adjusting the local molecular conformation of a responsive polyelectrolyte layer. Conformation of polyions can be manipulated by variations in pH or ionic strength. However, chemical variables are in general difficult to control. In addition, the characteristic time of response of molecules to changes of these parameters can be long. In this work we discuss how surface properties can be controlled following a completely different strategy, based on physical methods. We verified that conformation of adsorbed polyelectrolytes can be manipulated using and external electric field, as a consequence of their ionic charge. By dynamically tuning the conformation of the lubricant, fast variation of friction, adhesion and wettability can be achieved. The strong points and limitations of this method of surface properties control will be discussed.