

REVERSIBLE ADHESION BASED ON SMART POLYMERS COATINGS : FROM THE SYNTHESIS OF ORIGINAL LINKERS TO THEIR INTERFACIAL REACTIVITY

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Mots-clés : surface fonctionnalisation, smart interface, adhesion, plasma polymerization

Description :

Adhesive bonding is used in all fields of industry to assemble materials. In the context of **sustainability and recycling**, a powerful adhesive would i) create adhesion between two materials and ii) lose its adhesive properties under a specific stimulus. In order to develop such a smart adhesive and more interestingly to achieve **reversible adhesion**, the adhesive bond has to be very strong when in use whereas it needs to be easily and cleanly reversed by applying a stimulus. Unfortunately, such systems have never been addressed yet. Recently, the **Institute of Materials Science of Mulhouse (IS2M)** has started to investigate the concept of **smart interfaces with thermo-reversible properties** in collaboration with the **Institut Charles Sadron (ICS)**. Outstanding preliminary results have been obtained enabling reversible adhesion, based on smart polymer coatings, by a simple temperature change. This promising concept now needs to be spread by **developing smart linkers** that can be grafted on various surfaces and that have different thermo-reversible properties and by **exploring their interfacial reactivity** to control subsequently the reversible adhesion.

3 scientific challenges will be addressed during this PhD work: i) the **development of a simple synthetic route** to provide such smart linkers, ii) the **proof of concept of thermo-reversible properties** of such linkers and iii) the thorough **investigation of their interfacial reactivity** when they are grafted onto various surfaces. From a fundamental point of view, a fine thermodynamics study will enable to determine activation parameters to elucidate mechanisms of the interfacial reactions occurring thanks to the presence of smart linkers. The control of interfacial reactivity will ultimately help to tune the thermo-reversible adhesion between solid substrates for sustainability purposes or between a solid substrate and a biomolecule for sensing applications.

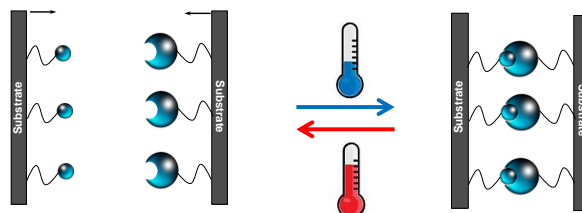


Figure 1 : Schematic illustration of the concept of reversible strong adhesion.

Références :

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