Development of Mechanofluorochromic Surfaces as Force Sensors

Thomas Recouly,[1] Sébastien Paloc,[1] Lorenzo Casimiro,[2] Rémi Métivier,[2] Clémence Allain[2]

[1] *ENS Paris-Saclay, DER, 91190 Gif-sur-Yvette*
[2] *ENS Paris-Saclay, CNRS, PPSM, 91190 Gif-sur-Yvette, France*
Email: thomas.recouly@ens-paris-saclay.fr

Mechanofluorochromic compounds have the capacity to change the color of their emission if they are subject to a mechanical stress. Therefore, they can be used to determine mechanical stress such as pressure or shearing. Among them, polydiacetylenes are a very interesting class as they can switch between a blue non-emissive form and a red emissive one. The blue form is obtained by photopolymerization of diacetylene and turns red after an application of either a mechanical activity or a thermal change. The reversibility of the transition, as well as the fluorescent change between the blue and the red form in a short time, opens the path to the creation of captors based on those molecules. We present herewith the covalent grafting of polydiacetylenes onto glass surfaces and their characterization via spectroscopy, microscopy or wettability measurements. These preliminary results pave the way to the coating of different substrates (e.g. microfluidics chips) and finally achieve fluorescent sensors for microscale forces.

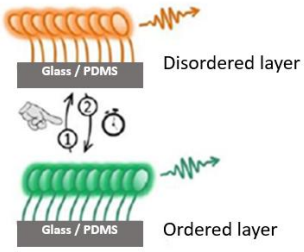

Figure 1. Emission change of mechanofluorochromic molecules covalently grafted on glass or PDMS.

[1] Adv. Mat., 2016, 28, 6, 1073-1095

[2] Chem. Mater. 2019, 31, 4, 1196-1222

[3] Chem. Commun., 2019, 55, 14566-14569