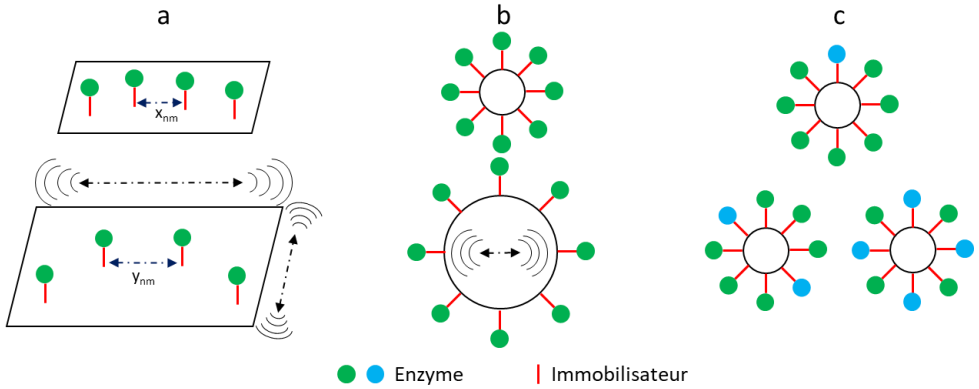
# PhD offer : Polymer surfaces with tunable enzymatic activity

**PhD supervisors** : Dr Anne-Françoise Mingotaud (afmingo@chimie.ups-tlse.fr) and Dr Cédric Montanier (montanie@insa-toulouse.fr)
**Laboratories**: Laboratoire des Interactions Moléculaires et Réactivité Chimique et Photochimique (IMRCP) et Toulouse Biotechnology Institut (TBI)
**French doctoral school**: Science de la Matière (SDM, ED 482)
**Funding** : INSA Toulouse / Université de Toulouse

**Context**: Valorization of plant residues constitutes an environmental and industrial challenge, considering our increasing demand of sustainable energy and synthons for chemical industry. However, these residues are extremely resistant to usual chemical degradation. Based on existing bacteria that are able to hydrolyze such residues, the aim of this PhD is the development of a bioinspired system enabling a synergistic work of enzymes able to transform these residues into different small molecules useful for industries. **The originality of this project consists in developing an elastic device, like rubber balloon, on which enzymes will be grafted**. Its enzymatic activity will then be controlled by the surface stretching. The aim is to obtain a completely tunable system sensitive to stretching. Depending of the intensity of this stretching, the distribution of the molecules produced by the enzymes will be changed, enabling fabrication of a range of molecules, for industries such as cosmetics or pharmaceutics.

**Working program**: The PhD work will consist first in the fabrication of the elastic device with adequate chemical functions for the enzyme grafting. Secondly, the enzyme will be produced and grafted. Finally, enzymatic studies will be performed to characterize the enzyme activities and the products. The work will therefore deal with chemistry (modification and grafting) and biochemistry/enzymology. This interdisciplinary project joins together 3 academic laboratories with different expertise in polymer science (IMRCP in Toulouse and LCPO in Bordeaux) and enzymology (TBI in Toulouse).




**Desired profile**: organic chemistry, knowledge in enzymatic catalysis is required. Appreciating interdisciplinary subjects is essential.

**To apply: please send CV and motivation letter** to afmingo@chimie.ups-tlse.fr and montanie@insa-toulouse.fr. Please include the last transcript of marks and the name of 2 possible referees.

**Reference** : Montanier, C. Y. *et al.* Changing surface grafting density has an effect on the activity of immobilized xylanase towards natural polysaccharides. *Sci. Rep.* **9,** 5763 (2019). Peruch, F. et al. Recyclable cross-linked diene elastomers comprising furanyl groups and precursors thereof. Brevet US2020109270 (2020)