BIO-INTERFACES: ENVIRONMENTAL AND HUMAN HEALTH THREATS SENSING AND PREVENTION

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We are investigating soft biointerfaces, which result from the functional association of amino- and nucleic- acids with polymers to develop materials of interest for applications in various areas, i. e. in the environmental, energy and biomedical fields.

For contaminant monitoring, we are focusing on the development of affinity-based assays, which would enable *in situ* and in real time detection of molecules of interest. Molecular recognition of the target relies on oligonucleotide switching structures, namely 'aptamers'. These 'chemical' antibodies have several advantages over their natural counterparts, in particular regarding chemical modification for functional grafting to polymers, which we use for instance to prepare polymer capsules, which specifically recognize the immunoglobulin E protein[1].

In a preventive approach, we are aiming at inhibiting bacterial contamination, which is relevant for several industrial segments, in particular in health and energy settings when considering biocorrosion. To develop antimicrobial and antibiofilm coatings, we are exploring the role of intrinsic material properties on initial bacterial retention[2]. In parallel, at the macromolecular scale, we are deciphering the role of polymers on amyloids aggregation.

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(2) Drebezghova, V.; Gojzewski, H.; Allal, A.; Hempenius, M. A.; Nardin, C.; Vancso, G. J. Network Mesh Nanostructures in Cross-Linked Poly(Dimethylsiloxane) Visualized by AFM. Macromol. Chem. Phys. 2020, 2000170. https://doi.org/10.1002/macp.202000170