Title	**Controlled Radical Polymerizations Compatible with Biological Environments**
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Research Group	**Benetti / Fantin**
Curriculum	**Polymer Chemistry / Industrial Chemistry**
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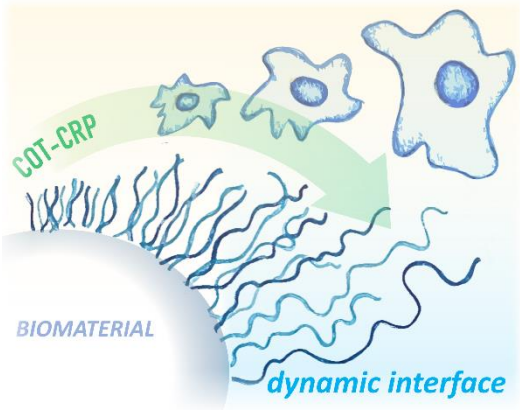
Project description:

Controlled radical polymerization (CRP) processes enable the synthesis of polymers with low dispersity, well-defined molar mass and precise architecture. A central limitation in the application of CRP for the fabrication and modification of biomaterials is correlated to the inert conditions required during the synthesis of polymers. In particular, the reaction mixtures typically require careful degassing, while the polymerization chambers necessitate to be kept appropriately sealed, or under oxygen-free conditions during polymer growth. In addition, the most versatile CRP processes encompass the use of cytotoxic catalysts based on transition metal-complexes, hampering their direct application in the presence of cells, and requiring careful purification of the modified supports when these are meant to be subsequently applied as biomaterials.

In this project we will develop a ***CRP process that is tolerant to oxygen and fully compatible with biological environments***, as those typically generated while culturing mammalian cells on model platforms or porous supports for tissue engineering.



Cytocompatibile and oxygen-tolerant CRP (COT-CRP) will enable the growth of compositionally diverse polymers directly grafted from biomaterials with different morphologies, and in the presence of seeded cells. The affinity of the substrates towards surface-interacting cells will be modulated through the progressive growth of functional polymers. In addition, the effects of polymer grafting on the behavior of cells (including viability, morphology, and proliferation) will be evaluated.

While crossing different research areas of chemistry, polymer and biomaterials sciences, this project emerges as markedly interdisciplinary, and will allow the PhD candidate to acquire skills across a variety of technologically relevant disciplines.

This project will be carried out in close collaboration with the laboratory of Prof. Krzysztof Matyjaszewski at Carnegie Mellon University (USA) and the research group of Prof. Harm-Anton Klok (EPFL Lausanne, CH). The PhD student will be requested to carry out research periods in these laboratories during his/her doctorate studies.