Open Position for Post doc Candidates: October 2022 - September 2023

Original Fluorinated Copolymers for Various Applications

Fluoropolymers display outstanding properties and can be involved in many High Tech applications[1] (optical fibers, resistant coatings[2], fuel cell membranes, various components in Lithium Ion batteries[2], photovoltaics, actuators, etc). Nowaday new functional fluoropolymers are searched for various challenges in telecommunications, electronics and Energy.[3]

The objective of this project deals with the synthesis and characterization of original fluorofunctional copolymers in 3 steps:

i) First, various (fluorinated) functional monomers will be designed[3] (or commercially available from catalogues);

ii) their radical (conventional[4,5] or controlled[6]) copolymerizations with various commercially available fluoroolefins [supplied from the industrial partner, such as vinylidene fluoride (VDF), hexafluoropropylene (HFP) or other F-olefins]. Eventually, the kinetics of radical copolymerization will also be attempted to classify the reactivity of such synthesized comonomers to those of the literature[5]; possible architectures (alternated, graft, block or hyperbranched copolymers) may also be designed for specific morphologies and applications;

iii). the resulting copolymers will be characterized by various analytical techniques involving SEC, NMR and IR spectroscopies, MALDI Tof spectrometry and their thermal properties will be studied by TGA , DSC and DMTA, while further tests may be requested by the industrial partner.

iv) Finally, possible cross-linking[7] of such copolymers may also be achieved to design even "better" materials.

Examples of original fluorofunctional copolymers (but not limited to) deal with those containing a fluorinated backbone that bears hydrophilic groups for specific applications.

The project results in a collaboration with a French Company (and possibly another University team expert on specific process of polymerization) while most of the research will be carried out at the Institute Charles Gerhardt (with possible industrial scale up).

References

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3. B. Ameduri, *Macromol. Chem. Phys*. **2020**, 221, 1900573 (doi 10.1002/macp.201900573)
4. B. Ameduri, *Chemical Reviews*, **2009**, 109, 6632-6686.
5. B. Ameduri, *Progr. Polym. Sci*. **2022**, in press (https://doi.org/10.1016/j.progpolymsci.2022.101591).
6. S. A. Mohammad et al., Progr. Polym. Sci., **2020**, 106, 101255 (https://doi.org/10.1016/j.progpolymsci.2020.101255
7. A. Taguet et al., *Adv. Polym. Sc*. **2005**, 184; 127-211

Post doc candidates (with a good knowledge of Polymer Science and Organic Chemistry) can directly contact B. Ameduri (UMR-CNRS 5253, Institut Charles Gerhardt bruno.ameduri@enscm.fr) submitting a CV and a cover letter.