

Responsive anisotropic polymeric nanoparticles

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Recently, assembling different materials having various properties, such as hydrophilicity or a surface charge, raised a lot of interest [1]. Indeed, generating anisotropic objects, having different properties in their composing parts, gives rise to unique properties for applications such as drug co-delivery, colloidal surfactants or biological sensors. [2-4] However, most of the production methods presented in the literature are time consuming and required multistep protocols (particles' formation followed by masking and surface modification). [5] We previously demonstrated the successful elaboration of Janus nanoparticles, having a chemical anisotropy, in a one single step by emulsification-evaporation method (Figure 1) [6].

This project will consist in i) synthesizing polymers varying from their nature and functional groups and II) producing anisotropic nanoparticles with two or more of these polymers by means of an unique elongational flow process developed at ICS. Functional groups will be selected such as to be make the nanoparticles responsible to the environment, e.g. UV or thermal stimuli.

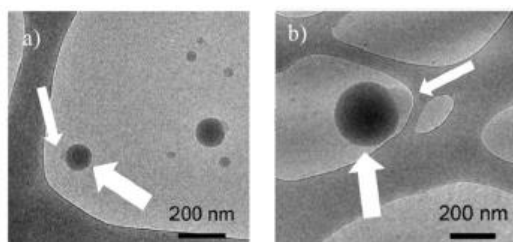


Figure 1: Cryo-TEM images of the Janus nanoparticles obtained from a hydrophobic (big arrow) and a hydrophilic (small arrow) polymer. [6]

References:

[1] N. Visaveliya *et al.* *Eur. Polym. J.* **2016**, 80, 256 ; [2] Z. Rahiminezhad *et al.* *Appl. Mater. Today* **2020**, 18, 100513 ; [3] B. T. T. Pham *et al.* *Polym. Chem.* **2015**, 6 (3), 426 ; [4] P. Yáñez-Sedeño *et al.* *Appl. Mater. Today* **2017**, 9, 276 ; [5] S. Ding *et al.* *J. Control. Release* 2019, 295, 319 ; [6] M. Vauthier *et al.* *Coll. Surf. A: Phys. Eng. Aspects* **2021**, 626, 127059

Possible starting date: October 2023

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