MESOPOROUS (ORGANO)SILICA NANOPARTICLES FOR DRUG DELIVERY

X. Cattoën,[a] R. Alvarado Meza,[a] P. Trens,[b] A. Montero Oleas,[a,c] S Aldabe Bilmes,[c]

[a] *Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000, Grenoble, France*
[b] *ICGM University of Montpellier, CNRS, ENSCM, Montpellier, France*
[c] *INQUIMAE, CONICET, Universidad de Buenos Aires, Buenos Aires, Argentina.*

Mesoporous Silica Nanoparticles have known a tremendous interest for their potential application in nanomedicine. Indeed, they possess excellent features to be used as drug delivery vehicles such as a low toxicity, a good rigidity, a large pore volume enabling the encapsulation of large amounts of drugs, and the possibility to functionalize easily their surface, for example for targeting cancer cells.[1] However, the mechanism of their synthesis is still not completely understood, and an important variability in the NPs size and shape is observed between reported syntheses. Furthermore, whereas important research has been devoted to small-pores, pure silica nanoparticles, little has been done on large-pores variants and on organosilica-based nanoparticles. In this presentation, we will discuss some simple mechanistic investigations on the synthesis of mesoporous nanoparticles using pH monitoring and light scattering measurements.[2] We will then describe the preparation of periodic mesoporous organosilica nanoparticles, which possess very interesting adsorption properties for small molecules.[3] Finally, we will present the synthesis of original Au@mSiO_2 core-shell nanoparticles with large pores, able to encapsulate proteins such as BSA, RFP and HRP (Figure 1).

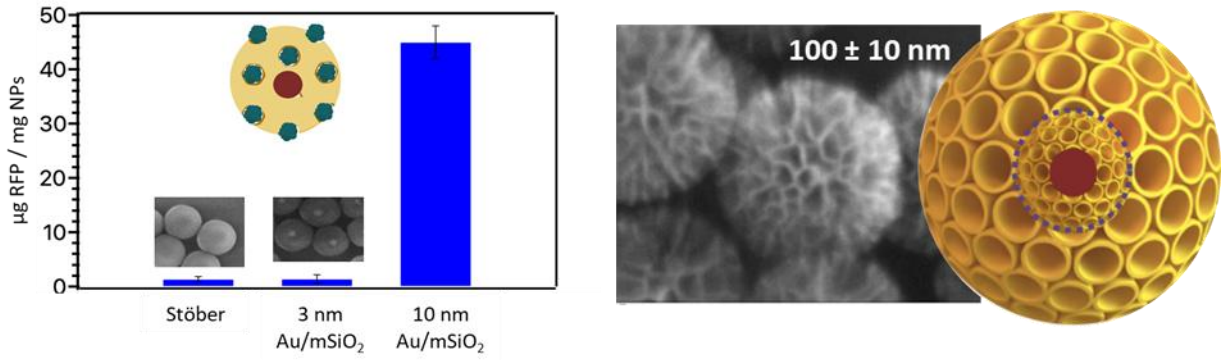

Figure 1: Encapsulation efficiency of a red fluorescent protein in dense (Stöber), small-pores or large-pores Au@mSiO_2 nanoparticles and SEM image of large-pores Au@mSiO_2 nanoparticles.

References

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