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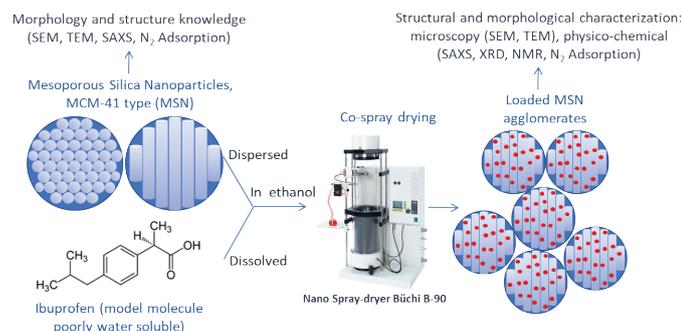
## CO-SPRAY DRYING AS AN ENCAPSULATION TOOL FOR ACTIVE MOLECULES: A STRUCTURAL CHARACTERIZATION POINT OF VIEW

*Procédé de co-atomisation séchage comme outil d'encapsulation de molécules actives : caractérisations chimiques et structurales*

Nanosystems for biomedical application present a great interest as therapeutic tools for the controlled release of active substances (vectorization). They have a high potential for the targeting or the enhancement of poorly water soluble drug bioavailability. Mesoporous Silica Nanoparticles (MSN) are relevant drug carriers due to their biocompatibility and high specific area. In this work, ibuprofen (model molecule) is loaded inside MSN (previously synthesized) by co-spray drying. Some properties after loading and their end-used properties can be modified depending on formulation parameters (Ibu:Si weight ratio, silica concentration, solvent) and process parameters (gas temperature, drying time, spray mesh size, ...).

Some characterization techniques allowed improving the properties knowledge of the MSN and the final carriers. Microscopy (TEM, SEM) reveals the aspect of the material. Physico-chemical characterizations give access to many information about the final product: DLS (MSN diameter), SAXS (porous organization), N<sub>2</sub> adsorption (specific area, pore diameter). The combination of different solid-state techniques informs about the physical state and the Ibu:Si interactions (TGA, XRD, SS NMR). Complementary and multi-scale characterization techniques permit a real understanding of the parameters influence on loaded-particles properties.

It permits to reveal that during the spray-drying, the drug is loaded firstly in the pores, and in different states related to the localization (inside or outside the pores of the MSN). The formulation parameters influences drastically the agglomerate structure and the physical state of the drug while the process parameters play a key role on the smooth operation of the drying and the global behavior of the powder in the drying chamber.



*Key steps of encapsulation by the co-spray drying process*