LARGE PORE MESOPOROUS SILICA (LPMS) AS AN APPROPRIATE CARRIER FOR LARGE THERAPEUTIC MOLECULES

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The synthesis of mesoporous silica-based materials, suitable for the encapsulation of theranostic substances and their delivery, has attracted a lot of interest in the last years.
The aim of this work is to synthesize silica-based microparticles with a large pore structure, in order to insert inside them unconventional large therapeutic molecules (i.e. antitumoral proteins, antimicrobial, peptides).
With respect to the classical way of synthesis[1] (pores dimensions in the range of 2-5 nm), LPMSs obtained in this work present a pores diameter in the range of 35-60 nm (Figure 1).

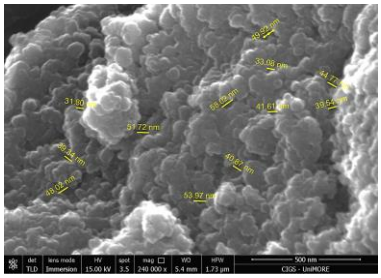

***Figure 1**: Pore dimensions in LPMS*

LPMSs with different porous structures can be synthesized starting from an acidic water solution of TEOS (tetraethyl orthosilicate, the precursor of silicate structure) reacting with different templates (P123 and F127, pore agents). Larger pores have been formed by using F127 and a positive linear relationship between pore dimensions and the increasing of ratios TEOS : surfactant has been obtained (Figure 2).

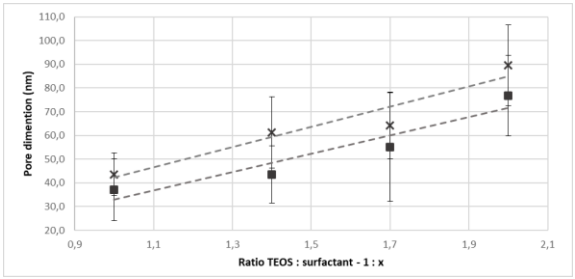

***Figure 2**: Relationship between pore dimensions and ratio TEOS : surfactant*

Doped LPMSs have been synthesized using Ca^{2+} (osteogenic activity) and Ga^{3+} (antitumoral activity), to achieve a synergic activity among the metal ion and the drug.
Loading tests have been performed comparing loading efficiency of LPMS instead of classical silica-based glasses. Positive results have been reached; large molecules have been inserted only in large pores.

[1] V. Nicolini, G. Malavasi, G. Lusvardi, A. Zambon, F. Benedetti, G, Cerrato, S. Valeri, P. Luches, *Ceramics International*, **2019**, 45, 20910-20920.