NANOSTRUCTURING MOLECULAR MATERIALS AS PARTICLES AND VESICLES USING DENSE GAS TECHNOLOGIES FOR DRUG DELIVERY

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The obtaining of new micro- and nanostructured molecular materials, and the understanding of how to manipulate existing bioactive materials at nanoscopic level, are playing a crucial role in clinical diagnostics and therapeutics and in special for drug delivery purposes. However, in order to be able to commercially exploit the enormous potential of these nanomedicines is necessary the development of efficient and environmental respectful technologies for the manufacturing at industrial scale of these nanostructured materials. The application of the dense gas technology, based in the use of compressed fluids, like CO_2, is an attractive option as it usually involves a single processing step and is able to produce micro- and nanoparticles, as well as nanovescicles, with narrow size distributions and free from residual solvents. In addition some of such dense gas technologies are scalable permitting therefore the preparation of large quantities of nanostructured materials.

In this lecture the fundamentals, advantages and drawbacks of dense gas technologies applied to drug processing will be discussed. Thus, several methods for structuring drug compounds –molecular and polymeric- as solid micro- and nanoparticles using compressed fluids -based in mixtures of CO_2 and organic solvents- will be described. Also a novel procedure for preparing dispersed nanovescicles for drug delivery purposes will be presented.