PREPARATION OF MICRO AND NANOPARTICLES OF A BIODEGRADABLE POLYMER BY A PCA BASED METHODOLOGY

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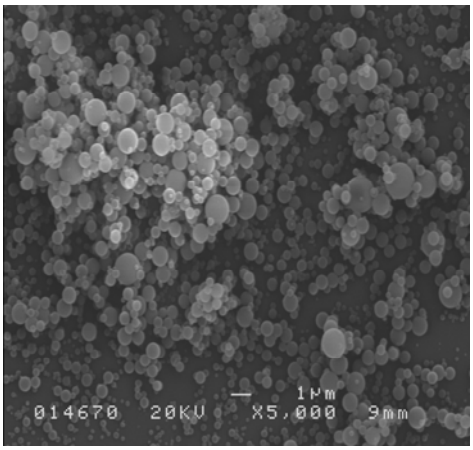
Abstract

The research in using biodegradable polymers for the improvement of the pharmacological features of a drug- such as solubility, stability, permeability to biological membranes, and targeting to particular tissues, cells and intracellular compartments-represents one of the major issues in the field of drug delivery [1]. In fact, pharmaceutical formulations mainly composed by micro or nanoparticles of a combination of an active principle and a biodegradable polymer are of special interest in the research of new and more powerful drug delivery systems. Conventional processes for the preparation of these materials present problems related to the big amount of organic solvent used and the poor reproducibility of materials physico-chemical characteristics during the scale-up.

By contrast, it is well known that processes using compressed fluids- such as CO_2- constitute efficient, reproducible and environmental respectful technologies for the manufacturing at industrial scale of nanostructured materials with unique physico-chemical properties (size, morphology, porosity…) [2,3]. In this work we have developed a suitable PCA (Precipitation with a Compressed Antisolvent) based methodology for the production of micro- and nanoparticles of a biodegradable polymer. The influence of the operational parameters (working pressure and temperature, initial concentration of the organic solution, organic solvent used) over the physical characteristics of the final material have been deeply studied *(See **Figure 1**)*.

a



b

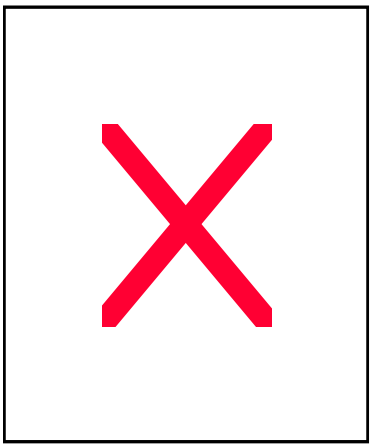


Figure 1. SEM images of the processed biodegradable polymer.Materials a and b were obtained by variation of the initial concentration of the organic solution in the PCA based methodology.

References:

[1] H. Okada, H. Toguchi. *Critical Reviews in Therapeutic Drug Carrier systems*. **1995**, 12,1-99
[2] N. Foster et al. *Industrial & Engineering Chemical Research.* **2003**, 42, 6476-6493
[3] M. Perrut, J-Y. Clavier. *Industrial & Engineering Chemical Research*. **2003**, 42, 6375-6383

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