CRISTALLYZATION OF ORGANIC POLYMERS THROUGH THE DELOS PROCESS: INFLUENCE OF THE OPERATIONAL PARAMETERS ON THE PHYSICO-CHEMICAL PARTICLE CHARACTERISTICS

M.Muntó, N. Ventosa, J. Veciana*

Institut de Ciència de Materials de Barcelona (CSIC), Campus Universitari de Bellaterra; 08193- Cerdanyola del Vallès (Spain)

ABSTRACT

The depressurization of an expanded liquid organic solution (DELOS) crystallization technique is a cost-efficient one step process for the straightforward production of nano- or micron-sized organic particles. The driving force of a DELOS crystallyzation process is the fast, large and extremely homogeneous temperature decrease experimented by a given solution, wich contains a compressed fluid (e.g CO_2), when it is depressurised from a working pressure to atmosferic pressure. This temperature decrese is caused by the evapotation of the compressed fluid from the solution during its despressurization.

At diference with other already reported high-pressure crystallization techniques (RESS, GAS, PCA, PGSS), in a DELOS process the compressed fluid behaves as co-solvent over the initial organic solution of the solute to be crystallized. We have proved that through a DELOS process is possible to achieve the size reduction of organic polymers obtaining stable polymer suspensions or fine powders.

The influence of the operational parameters (pressure, temperature, CO2 content, nature and composition of the organic solvent) on the particle physico-chemical characteristics (size, size distribution, morphology, melting point, glass transition temperature, crystallinity) has been studied through different analytical techniques, such as SEM, TEM, AFM, Light Scattering, XRD and DSC.