

Particles production by membrane-based technologies: basic principles and recent applications

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In the early 1990s, membrane contactors (MC) have been introduced for the production of micro and nanoparticles with a narrow particle size distribution and controlled size. In the so-called membrane emulsification process, two immiscible phases are separated by the membrane and a high interfacial tension exists between the membrane surface and the droplet-forming phase. More recently, an innovative method for the production of polymeric nanoparticles by combining MC with the well-known nanoprecipitation has been introduced. In this case, two miscible phases are separated by the membrane and meet each other at the pore exit where the mixing of the polymer solution (in an organic solvent, i.e., acetone) with the non-solvent phase (i.e., water) occurs. An overview of membrane emulsification and membrane nanoprecipitation principles and mechanisms will be given during the presentation. The main process and phases parameters, as well as key membrane characteristics that affect the performance of particles production by membrane technologies will be highlighted. Examples of applications of membrane emulsification and membrane nanoprecipitation into the fine-tuning of micro-nanoparticles will be also presented.