Supercritical assisted injection in a liquid antisolvent for polycaprolactone loaded antioxidants microparticles

Ida Palazzo[1], Paolo Trucillo[2], Mariarosa Scognamiglio[1], Ernesto Reverchon[1], Roberta Campardelli[*3]

[1]Supercritical Fluids Lab., Department of Industrial Engineering, University of Salerno, Via Giovanni Paolo II, 132 – 84084 Fisciano (SA), Italy

[2]Department of Chemical, Material and Industrial Production Engineering, University of Naples Federico II, Piazzale V. Tecchio,80 -80125 Napoli, Italy

[3]Department of Civil, Chemical and Environmental Engineering (DICCA), University of Genoa, Via Opera Pia 15- 16145 Genova (GE), Italy

Antioxidants are widely used as ingredients in food supplements and their integration in the diet has benefits on human health and contributes to the prevention of degenerative diseases. Despite their particular application interest, antioxidants are photosensitive and volatile compounds, unstable and sensitive to oxygen, light and heat. Antioxidants entrapment in a polymeric matrix could be a possible strategy: it offers many advantages, also allowing protection against oxidation and degradation of same compounds.

In this work, a supercritical based process, named Supercritical Assisted Injection in a Liquid Antisolvent (SAILA), has been proposed for the encapsulation of two antioxidant, α-lipoic acid (αLA) and eugenol (Eug), in polycaprolactone (PCL) microparticles, to improve the compounds bioavailability and protect their antioxidant properties.

Experiments for the coprecipitation of PCL/αLA and PCL/Eug were performed. Obtained particles were spherical and not aggregated. Using SAILA, coprecipitated particles of PCL/ αLA and PCL/Eug with high entrapment efficiencies, up to 90%, were obtained. The coprecipitates were characterized by a homogeneous antioxidant dispersion in the polymer matrix.

Graphical abstract