

# Development and characterization of PLA nanoparticles as carriers for topical delivery

Bruno Fernandes<sup>1</sup>, Raquel Silva<sup>1</sup>, Andreia Gomes<sup>2</sup>, Artur Cavaco-Paulo<sup>1</sup>

<sup>1</sup> CEB—Centre of Biological Engineering, University of Minho, Campus of Gualtar, 4710-057 Braga, Portugal.

<sup>2</sup> CBMA—Centre of Molecular and Environmental Biology, University of Minho, Campus of Gualtar, 4710-057

Contact e-mail: brunof\_06@hotmail.com

## Abstract

Nanoparticles are seen today as one of the best approaches for the delivery of drugs into the skin. Poly (Lactic Acid) (PLA) is biocompatible and biodegradable and already approved for clinical use. Thus, this work aimed to study the effect of several parameters on the properties of PLA nanoparticles (PLA-NPs) intended for topical delivery. The yield of nanoparticles formation and entrapment efficiencies of lipophilic and hydrophilic model compounds in PLA-NPs were assessed. We evaluated the effects of mechanical stirring, solvent composition and presence of tri-bloc polymers on the protocol for the production of PLA-NPs. The best protocol provided a monodispersed population of non-cytotoxic spherical particles of  $\approx 150$  nm and a yield of nanoparticles formation of  $\approx 90\%$ . This formulation also proved to be efficient in the encapsulation of lipophilic and hydrophilic model compounds ( $>80\%$ ). The best protocol for the production of PLA-NPs includes a nanoprecipitation step, which is easily up scalable.