

“ADVANCED NANO- AND MICRO-TECHNOLOGIES FOR PULMONARY DELIVERY OF SMALL MOLECULES AND BIOTHERAPEUTICS”

Nowadays, the development of *Drug Delivery Systems* (DDS) represent a well-established technological strategy to improve drug bioavailability and ability to permeate through biological membranes. Advanced DDS have a burgeoning potential in the pharmaceutical field and, more generally, in the healthcare sector, to promote drug absorption and to maximize its therapeutic efficacy. Nonetheless, the DDS ability to overcome the biological barriers imposed by the administration route is especially crucial. With this idea in mind, an increasing research interest has been devoted to engineered nano- and micro-particulate systems gaining access to poorly accessible regions of the human body, as lungs. Due to their unique characteristics, inhaled particles maybe designed to tackle lung barriers and to harness novel drugs for inhalation, rather than to repurpose old ones (*drug repositioning*). Along these lines, the general aim of this project is the design and development of a new generation of nano- and micro-carriers for pulmonary delivery of small molecules and biotherapeutics (nucleic acids, antigens, monoclonal antibodies) for prevention and treatment of severe lung diseases. Special attention is focused on the development of engineered polymer particles able to deliver the intact drug in conductive airways, to shield its interactions with lung environment and to enhance the interaction with cell target. Enabling lung delivery of novel RNA therapeutics through tailored nanoparticles is envisaged.