

ICB PhD public presentations

COLLOIDAL POLYMER NANOPARTICLES AS BUILDING BLOCKS TOWARDS FUNCTIONAL COMPOSITE MATERIALS

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HCI H 2.1, 11.00 h



Project Summary: In this doctoral work, the synthesis, functionalization and application of polymer nanoparticles were investigated aiming at producing composite materials with improved properties. Fundamental work on the aggregation behavior of polymer colloids was initially conducted to study the kinetics of the system subjected to intense shear. As an application of this understanding, polymer nanoparticles were mixed with functional inorganic fillers and shear-aggregated to form fractal, porous clusters. Once mixed with ionic liquids, safer electrolyte systems for batteries could be prepared from such clusters through compression molding. Notably, the ionic conductivity and the electrochemical properties of such separator assembled in coin cells showed superior performance. In the frame of another application, soft copolymers were synthesized, spray-dried and re-dispersed to form concrete-based waterproofing membranes with remarkable crack-bridging properties at low temperatures.

CV. Stefano Caimi completed his Bachelor in Chemical Engineering at Politecnico di Milano in 2013. After industrial internships at De Nora (Italy) and BASF (Germany), he received his Master in Chemical and Bio-Engineering at ETH in 2015. In the same year, he joined the group of Prof. Morbidelli as a PhD student.