

Synthesis of Hybrid Nanoparticles via Aerosol Photopolymerization

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Abstract:

Present work is focused on producing polymeric nanoparticles using aerosol photopolymerization – an eco-efficient, surfactant-free and continuous polymerization process with immediate formation of radicals without the need for heating. This technique is a good alternative to water-based emulsion polymerization processes towards the synthesis of spherical polymeric nanoparticles and nanocapsules, as well as nanostructured particles. In addition, the aerosol photopolymerization process has been used to produce organic-inorganic spherical nanocomposites (ZnO nanoparticles inside a polymeric matrix). The recent project is concentrated on adjusting this technique to produce polymeric hybrid nanoparticles with tunable diameter via thiol-ene polymerization. Advantages of thiol-ene chemistry (i.e. radical initiation, step-growth mechanism, fast polymerization, consumption of all monomers) are used to produce spherical polymeric nanoparticles with silver or gold nanoparticles inside. These hybrid nanoparticles can be an effective tool for cancer diagnostics and treatment.

The process follows an elementary protocol. A spray solution containing silver nanoparticles of chosen size, monomers (thiol and alkene), photoinitiator and the volatile organic solvent was atomized using commercially available pneumatic aerosol generators forming a droplet aerosol. Droplets were polymerized during the passage through photoreactor and converted into silver nanoparticles encapsulated into a polymeric network. Collected nanoparticles were functionalized with biomolecules using conjugation techniques for further means of application.

Biography :

Narmin Suvarli M.Sc. has gained her Master's Degree from the University of Helsinki and started her Ph.D. at the Karlsruhe Institute of Technology in 2018. She is a part of Innovative Training Network (ITN) "Towards next generation Eco-efficient PHOTO and EMULSION Polymerizations" funded by the European Horizon 2020 Marie Skłodowska-Curie Actions programme. As an Early Stage Researcher of this program, she is currently collaborating with Institut Charles Sadron (University of Strasbourg) and PESCHL Ultraviolet.

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