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Structural Characterization of Organic Nanoparticles Prepared by Antisolvent Precipitation

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The production of organic nanoparticles (NPs) via antisolvent precipitation (AP) is a less-invasive and low-cost alternative to top-down methods like high-pressure homogenization [1]. Thus, AP is receiving growing attention, e.g. for the preparation of nanodispersions of pharmaceutical ingredients [2]. For instance, the antioxidant coenzyme Q10 (Q10) has several health protective effects and Q10 NPs showed improved bioavailability compared to free Q10 [3, 4].

Here we report the structural characterization of Q10 NPs produced by AP. The NPs are analyzed by photon correlation spectroscopy (PCS), cryogenic transmission electron microscopy (CryoTEM), small-angle X-ray and neutron scattering (SAXS; SANS, KWS-1 at MLZ). In particular, the combination of SAXS and SANS studies allows the investigation of the molecular structure of the NPs and the interface between the NPs and the dispersion medium [5]. Our experiments revealed, that Q10 NPs prepared by AP are stable with and without added stabilizer, have a particular small size (down to ~ 20 nm in diameter), and exhibit a specific stabilizing layer, suggesting a self-stabilizing process of the Q10 molecules.

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