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Soft X-ray analysis of microgels and polymer-based microcontainers in aqueous environment

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Polymer-based microgel and core-shell particles are versatile containers for the transport of drugs, theranostic gases or catalytically active molecules. They are in many cases biodegradable and fully compatible to *in-vivo* applications. During recent years we have investigated a broad range of such hybrid materials ranging from gas filled microballoons and thermoresponsible microgel networks to magnetoresponsive particles with embedded iron nanoparticles and core-shell systems filled with theranostic gases or catalytically active fluids (e.g., ionic liquids). Soft X-ray microscopy is an excellent tool to study those systems *in-situ* in aqueous matrix with high-resolution and chemical sensitivity. We have analyzed shell thicknesses, swelling behaviors and temperature response to contribute better understanding on release mechanisms and have developed procedures to derive high-resolution 3D representations of the particles from 2D transmission X-ray micrographs. The project is funded by the BMBF (05K16WED).

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