



Contribution ID: 374

Type: **Poster**

Pharmaceutical Nanoparticles – Study by Neutrons, Photons and DLS

Tuesday, 18 September 2018 17:15 (15 minutes)

Specific target Nanoparticles for therapy of cancer and other diseases were assembled from lipids, polymers and bio-ferrofluids. For cell targeting proteins were bound to the surface (corona). The structure and dynamics was investigated by SANS, DLS, SAXS and ASAXS as the multi-domain particles depict a size of 20-200 nm. Structure-material domains were localized by contrast variation in SANS and ASAXS.

The structure of the modified nanoparticles is analyzed by dynamic light scattering DLS in combination with neutron small angle scattering SANS and metal specific X-ray scattering ASAXS. The multi-targeting modification is applied to drug and lanthanide loaded polymer nanoparticles (metal-PLGA, patent of the Gutenberg-University for RT), modified bio-polymers and liposomes as fast development system. The final targeting protein modification is followed by time resolved SANS with deuterium contrast variation in combination with dynamic light scattering (SANS-DLS). The bio-compatibility and the therapy effect of nano-drug constructs are proven in our time-resolved cell culture EPN test (exponential necrosis and proliferation test). Oral nano-drug application is tested with time-resolution by a simulator device of the gastro-intestinal tract with SANS-DLS observation.

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Session Classification: Poster session 2

Track Classification: P3 Structure and dynamics in life sciences