



Contribution ID: 238

Type: Poster

Pharmaceutical Drug Carriers organized in Nano-Domains – Study and Design upon Neutron Scattering with contrast variation, SAXS and DLS

Wednesday, December 9, 2020 5:40 PM (20 minutes)

Specific target Nanoparticles for therapy of cancer and other diseases were assembled from lipids, polymers, and pharmaceutical drugs or mRNA. For cell targeting proteins were bound to the surface (corona). The structure in solution is analyzed by dynamic light scattering DLS combined with neutron small angle scattering SANS, SAXS, metal specific X-ray scattering ASAXS. Material sub-domains in the nanoscaled drug carriers (100 nm, polymer complexes, liposomes) were localized by contrast variation.

The nanoparticles, e.g. biodegradable polymer (PLGA, Carbohydrates), intestinal lipid-bile nanoparticles, lipid particles, proteins and optional bio-target domain are amphiphilic. Thus the internal particle structure forms sub-domains of different material and scattering power, enabling a localization by contrast. For several medical cases we construct and study pharma nanoparticles for parenteral and oral applications, which contain soluble or hydrophobic drugs, or nucleic acid drugs, e.g. mRNA. Cell or tumor recognition and uptake of the drug carriers can be obtained by a surface protein, ligand head.

mRNA nano-complexes for immune-vaccination and cancer therapy work by cellular synthesis of the corresponding protein (not the antigen, but the genetic information for it is supplied). Oral nano-drug application is tested with a simulator device of the gastro-intestinal tract with SANS-DLS observation of drug nanoparticles and intermediates.

Primary author: Dr NAWROTH, Thomas (Gutenberg-University, Pharmaceutical Technology, Staudingerweg 5)

Co-authors: Dr SIEWERT, Christian (Universität Mainz); Dr ZILLER, Antje (Universität Mainz); Mr UEBING, Lukas (Universität Mainz); Mr KLAK, Michael Patrick (Universität Mainz); Mrs CORNET, Vera (University Mainz); Dr AL-GOUSOUS, Jozef (University Mainz); Prof. SAHIN, Urgur (University Medicine Mainz, BioNTech); Dr HAAS, Heinrich (BioNTech SE and University Medicine, Mainz); Mrs NOGUEIRA, Sarah (BioNTech SE, University Mainz); Dr JOHNSON, Raphael (Nkrumah University); Dr SVERGUN, Dimitri (EMBL c.o. DESY); Dr SCHROER, Martin (EMBL c.o. DESY P12); GOERIGK, Guenter (Helmholtz-Zentrum-Berlin); SCHWEINS, Ralf (Institut Laue - Langevin); RADULESCU, Aurel (Forschungszentrum Jülich GmbH, Jülich Centre for Neutron Science at MLZ); SCHRADER, Tobias; Prof. LANGGUTH, Peter (University Mainz)

Presenter: Dr NAWROTH, Thomas (Gutenberg-University, Pharmaceutical Technology, Staudingerweg 5)

Session Classification: Joint poster session of MLZ User Meeting and DN2020

Track Classification: DN: Life Science/ Biology