Biomedical Engineering Department Seminar

Emulsomes Meet S-layer Proteins: A new Nanoparticular Platform for the Delivery of Lipophilic Compounds

2:00 PM Wednesday, October 1, 2014
Meeting Room in Engineering Floor (2nd Floor)
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This talk introduces a novel lipid based nanocarrier system, so-called emulsomes, as a drug delivery platform facilitating the delivery of hydrophobic bioactive agents, whose medical use is otherwise limited. Curcumin, a poorly water-soluble natural polyphenolic compound with intrinsic anti-cancer properties, was encapsulated in emulsomes. The new nanoformulation, named as CurcuEmulsomes, did not only overcome the bioavailability limitation of the compound and increase its solubility by 10,000 fold, but also exhibited promising therapeutic efficacy against HepG2 human carcinoma cell line in vitro. Further to achieve active delivery, CurcuEmulsomes were coated - for the first time - with crystalline bacterial cell surface layer (S-layer) fusion proteins with functional protein G domains. This allowed the nanocarrier to bind the human immunoglobulin (IgG) domains specifically, whereas no interaction was observed for those lacking these functional groups. Concisely, the promising in vitro efficacy of CurcuEmulsomes and the capability of S-layer fusion technology to add functional surface characteristics to emulsomes highly feature the potential of S-layer coated emulsomes for in vivo therapeutic applications.

Dr. Mehmet H. Ucısık received the B.E. degree in Chemical Engineering from Bogazici University in 2004, and the MSc. Degree in Biotechnology from TU Delft, the Netherlands, in 2006. He trained from 2007 to 2009 as a scholar of NSF and Tubitak Joint Project at Istanbul Technical University. He recently received his PhD degree (with distinction) in NanoBiotechnology at University of Natural Resources and Life Sciences, Vienna, Austria. His PhD study introduced a novel lipid based nanocarrier system, so-called emulsomes, which may bring the lipid based systems again to the frontline against their polymer alternatives. To enable the sustained release of anti-cancer agent curcumin into the cell, he introduced a new nanoformulation, i.e., CurcuEmulsomes, which was press-released by some medical news agencies as well as national newspapers including der Standard, Krone, Kurier and Falter-Heureka. Subsequently, CurcuEmulsome study was selected by Global Medical Discovery as a 'Key Scientific Article' contributing to excellence in biomedical research.