Lipid Core Alginate Microcapsules for Tissue Engineering
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Introduction
The use of nanomaterials in tissue engineering is rapidly growing¹,². We report on a lipid core alginate microcapsule for delivery of lipophilic drugs, a steady drugreleas into targeted cells or tissues is proposed. Engineered surfaces and protein conjugation enables cellular intake, provides stealth function or targeted uptake.

Materials and Methods
Lipid core alginate microcapsules are formed through emulsification (o/w) using interfacial alginate gelation by calcium ions followed by surface engineering. Fluorescent and confocal microscopy studies using Phalloidine- and Dapi staining and Trypan blue fluorescent quenching shows cellular uptake of FITC-labelled microparticles. Self assembly of polymers and EDC/NHS chemistry engineered surfaces were analyzed by zeta potential measurements (data not shown)

Results
Confocal microscopy (Fig.1: A,B) studies showed that membrane thickness and density of lipid core alginate capsules depend on calcium and alginate concentration and on droplet size.

Encapsulation and release of model drugs was demonstrated (Fig. 1: C,D). A steady diffusion based release mechanism limited by the equilibrium partition is proposed. The uptake of microparticles simulating lipid core alginate microcapsules into NT2 cells was demonstrated.

Discussion and Conclusions
The demonstrated encapsulation method is a fast, cheap and a self controlled process. Core materials are chosen by drug solubility and biocompartibility. The size of lipid core alginate microcapsule is controllable from 300 nm to 10 µm and within size range of particles that can be internalized by cells³,⁴. We envision the use of such microcapsules for the delivery of drugs that can stimulate the necessary differentiation and proliferation of cells in tissue engineering applications.

References

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Disclosures
Authors declare no conflict of interest.