54.P07
Light triggered drug release

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In therapy of cancer the systemic application of drugs is the most common procedure (chemotherapy). Highly undesirable side effects of these drugs to the entire organism like bone marrow suppression, immunosuppression or alopecia (hair loss) is still a problem in this kind of treatment. By targeting and controlling dosage of anticancer drugs side effects can be minimized. Thus, product efficiency and safety, as well as patient convenience and compliance can be improved. In a novel approach the model drug/antimetabolite 5-Fluorouracil (5FU) is immobilized on/released from a microgel surface. By use of (2+2) Diels-Alder cycloaddition a dimer of 5FU is synthesized in a UV-photoreactor and subsequently bound to a beta-cyclodextrin cage. Photochemical cleavage of 5FU dimers occurs in a certain range of wavelength and allows a controlled - light triggered - release of 5FU. In this study the influence of different light sources, intensities and irradiation times on release kinetics is investigated. The drug release is quantified by high pressure liquid chromatography. Aim of the activities is the development of a drug loaded stent with targeted and controllable drug release by use of laser irradiation. Research on this novel drug release system is funded within the 'Boost Fund' program of 'Exploratory Research Space' at RWTH Aachen – ERS.

54.P08
Heparin mimetic peptide amphiphile nanofibers for angiogenesis

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Angiogenesis is a basic physiological process during both development and tissue regeneration. Formation of blood vessels is triggered by interaction with the glycosaminoglycans (GAGs) situated in extracellular matrix (ECM) and vascular endothelial growth factor (VEGF) secreted by endothelial cells. Since VEGF activity is modulated by heparin which is a component of ECM, mimicking the ECM is a promising approach in tissue engineering. Here, we demonstrate a novel peptide nanofiber system that mimics the heparin functionality to induce angiogenesis in pancreatic islets without addition of any exogenous growth factors in vitro. Viability of rat islets was examined by Alamar blue/DNA assay for 21 days. Sprouting was shown by lectin staining. In order to show the functionality of islets, glucose-stimulated insulin release assay was performed. Results indicated that heparin-mimetic PA increases the viability of islets compared to control group. These promising results stem from peptide nanofibers' bioactivity, which induce sprouting formation and mechanical support that keeps the islets intact. Also, glucose assay showed that cells are functional and produce insulin. In conclusion, we report that heparin-mimetic PA nanofibers designed by our group alleviates some of the handicaps of islet transplantation.

54.P09
Modeling of release kinetics of silver nanoparticles from novel alginate nanocomposites aimed for biomedical applications

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Alginate hydrogels with embedded silver nanoparticles (AgNPs) are very attractive for biomedical applications as antimicrobial materials due to the possibility of AgNPs controlled release. In order to predict the antimicrobial activity, it is necessary to know the release kinetics, which depends on the hydrogel size and shape as well as on the surrounding hydrodynamic conditions. In this study, we have produced alginate microbeads (1.9% w/v, ~600 μm in diameter) with incorporated, electrochemically synthesized AgNPs (1.8 mM) and studied the silver release kinetics in distilled water at 37°C in three different systems: static dishes, shaken flasks and packed bed bioreactors (0.27 ml/min perfusion rate). AgNPs release was monitored over 3 weeks by UV-Vis spectroscopy while total silver concentrations in water and in microbeads were determined by AAS. Release kinetics of AgNPs was modeled by internal diffusion within the microbeads followed by external mass transfer and silver oxidation, assumed to be a first order reaction. Internal diffusion was found to be rate limiting in all investigated systems with the AgNPs apparent diffusion coefficient in the hydrogel of ~10^(-11) cm^2/s, while the fluid flow increased the overall transfer rate for 65–85%.

54.P10
Genipin crosslinked gelatin hydrogel: Tolbutamide release and cytocompatibility

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Gelatin based drug carrier matrices have gained immense interest as a promising class of delivery system. The aim of this study was to develop model drug Tolbutamide -loaded-gelatin based gels. Gelatin gel due to its reversible gel-sol transition at ~35°C and potentially low gel strength is often chemically crosslinked to improve its thermal and mechanical stability. Here, gelatin matrices were crosslinked with genipin, a naturally occurring crosslinker for the release of tolbutamide. Tolbutamide (an anti-diabetic drug) was incorporated into the gelatin matrices to form drug loaded gel for the release study. Morphological analysis of crosslinked gels using confocal microscopy revealed network structure. The release of tolbutamide from the crosslinked gels indicated an initial increase upto 8 h. This was followed by a steady release state after 20 h (52%). Release kinetics was determined following Peppas model. The diffusional exponent (n) (0.84 ± 0.01) ($P < 0.05$) indicated anomalous release behaviour. Further, in vitro cellular compatibility and normal cell proliferation in AH-927 cell line was observed in live dead assay and fluorescence microscopy studies using propidium iodide staining. The studies supported that the matrices display excellent compatibility without compromising the cellular integrity and thus, can be utilized as safe carrier matrices for drug transport.