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PEGDA AND PETA AS POTENTIAL MATERIALS FOR DRUG DELIVERY SYSTEM DEVELOPMENT

Natalia Rekowska
University Medical Center Rostock, Germany

In this study we investigated the biocompatibility and thermodynamic properties of two photopolymerisable compounds: poly(ethylene glycol) diacrylate (PEGDA) and pentaerithritol tetraacrylate (PETA). These compounds are intended to be used for the manufaturing of drug delivery systems (DDS) by a novel additive manufacturing (AM) process. This novel AM process combines stereolithography (SLA) and inkjet printing (IJP). While SLA creates the basic body of the DDS layer by layer, IJP is used to selectively print drug depots inside the DDS. The positioning of drug depots as well as the combination of these two co-monomers can create the possibility to develop a DDS with highly controlled drug release. An initial study focused on biocompatibility of conventionally cured specimens with the use of photoinitiators (PI) as radical starters for photopolymerisation. Eluate tests were performed after two different washing procedures of the samples. It is shown that the samples with the addition of PETA require washing at 50^{0}C. After glass transition temperature (Tg) measurements it appears clear, that Tg increases with the increasing PETA concentration in the sample. It is known, that the lower Tg is, the faster occurs the drug release. The biocompatibility was tested via direct contact tests. They reveal that most of the samples average cell vitality is between 70%-90% regardless of the photoinitiator concentration and PETA concentration. All of the samples show contact angles under 90°. Some differences of the samples morphology were observed after the washing procedure. What is more, samples with the addition of 10% PETA, especially the ones also with lower PI concentration seem to be smoother and more homogenous than the samples without the PETA addition.

BIOGRAPHY

Natalia Rekowska studied pharmacy at the Medical University of Gdansk (Poland). During the studies she was an active member of the students' scientific circles. She prepared her master thesis at the Ludwig Maximillian University in Munich (Germany) at the Department of Pharmaceutical Chemistry. Afterwards she began PhD studies at the Pharmaceutical Department of the Medical University of Gdansk and worked as a pharmacist in a pharmacy. Since September 2018 she is a PhD student at the Institute of Biomedical Engineering of the University Medical Center Rostock under lead of Prof. Niels Grabow. Within the framework of the DFG project "3D printed drug delivery systems with the ability of time controlled drug release" she is involved in the development of novel, photopolymerisable drug delivery systems with time-controlled release of high and low molecular weight drugs.

natalia.rekowska@uni-rostock.de

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