

MIDDLE EAST PHARMACY AND PHARMACEUTICAL CONFERENCE

September 24-25, 2018 Abu Dhabi, UAE



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Smart drug delivery systems by thermal and electrohydrodynamic processes

This seminar will cover the challenges and opportunities in pharmaceuticals by adopting new formulation technologies to bring new products into the market. Thermal and electrohydrodynamic processes including Fused Deposition Modeling (FDM) 3D printing and electrospinning are an example of technologies that have been widely used in other industries, however are new to pharmaceutical manufacturing. Therefore, the use of these techniques in drug delivery and tissue engineering applications, including the use of state-of-the-art techniques (e.g. FastScanAFM, ToFSIMS, nanoCT) will be discussed in this seminar. The first part will focus on the preparation of drug-loaded polymeric electrospun nanofibers. The purpose of this study is to examine any potential effects, chemical and mechanically, of drug loaded electrospun nanofiber scaffolds. Biodegradable polyesters that commonly used in biomedical applications for controlled release and targeted drug delivery were loaded and electrospun with different types of drugs. The electrospun fibers were characterized through various methods in order to measure the drug efficacy, antibacterial properties and drug-polymer interactions. There are a number of different applications within medicine that require materials to be developed with the optimal characteristics, such as their strength, rate of degradation and porosity, as well as their shapes and sizes. 3D printing process was patented in 1986, however only recently have been utilized in the field of pharmaceutical printing. Therefore, in the second part, 3D printed systems (e.g. microneedles, rings, tablets) of various designs with high drug payloads that have been formulated using advanced additive technologies and characterized using advanced characterization techniques will be discussed.

Biography

Dimitrios A Lamprou is professor in pharmaceutical engineering and MSc Director at the School of Pharmacy in Queen's University Belfast, UK; a member of the prestigious Russell Group and Visiting Professor at University of Strathclyde, Glasgow, UK with experience of teaching in higher education, conducting research (60+ publications, 200+ conference abstracts, 55+ invited presentations). His group research interests focused on five distinct areas: Biosurface engineering, electrospinning, microfluidics, nanoanalysis, and printing of medicines.

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