Dr. Alexander Krok Biography & Abstract

Biography

Dr. Krok graduated with a BSc degree in Organic Chemistry and MSc degree in Chemical Engineering at Faculty of Chemical and Food Technology (FCHPT-STU, Slovakia). He completed a PhD in Chemical and Process Engineering at Faculty of Mechanical Engineering in Slovak University of Technology (SjF- STU, Slovakia) in 2011 and for the next four years he lectured and coordinated over 400 undergraduate and postgraduate students at the STU. From 2014 to 2016, Dr. Krok spent two years at University of Surrey (UoS, United Kingdom) as a Marie Curie Fellow (EC FP7-IEF) in Prof. Wu's research group and between 2016-2017 he worked at Research Center Pharmaceutical Engineering (PMTC, Austria) as a Senior Scientist. Dr. Krok also support market focused applied research in Ireland between 2017-2019 at Cork Institute of Technology (CIT, Ireland) and Pharmaceutical Manufacturing Technology Centre (PMTC, Ireland) as Research Fellow and currently he is Marie Curie Fellow (EC Horizon2020) at CIT (Ireland) and Pfizer Newbridge (Ireland) focusing in development of multidisciplinary approach which will allow to predict the final properties of bilayer tablets producing by a dry granulation process.

Abstract

Robust Prediction Models in Pharmaceutical Engineering

Although the manufacture of pharmaceutical tablets has been successful for over several years, there is still a need for improvement, to ensure that the manufacturing process will satisfy both technological and therapeutic specifications as well as regulatory requirements. Its well-known that the pharmaceutical tablets are the dominant dosage form for drug delivery which are produced by compressing dry powder blends of different functionalities in a die. On the other hand, it is technically challenging to ensure that a tablet possesses both a certain mechanical strength and a low packing density, so that it is sufficiently strong to maintain its integrity during handling and transport while simultaneously weak enough to satisfy the dispersion and dissolution requirements for pharmacological administration. Often, the compressibility of the powder is calculating only along the axis of the device; consequently, critical areas of the material throughout the volume could not be identified. Dr Krok will therefore briefly summarize the current research in the field of powder compaction and he also will describe some aspect regarding to FEM and prediction of the mechanical behaviour of powder during compaction. Moreover, the temperature often rises in the compressed powder during manufacturing, which can affect physiochemical properties of the powder, such as thermal degradation and change in crystallinity. Thus, it is of practical importance to understand the effect of process conditions and material

properties on the thermal response of pharmaceutical formulations during compaction. Dr Krok will therefore also present some aspect between temperature rise in powder and its dependency on material properties, compression speed and tablet shape. Especially, it will be shown some experimental exploration as well as developed FEM strategy to predict thermo-mechanical behaviour of pharmaceutical powders during tableting. The production of bilayer tablets has proven challenges as the layered tablets are prone to fracture by delamination, normally along the interfaces between different layers. It is important to note that this adhesion-cohesion interaction on the interface of layers tablets has not been intensively investigated to date and availability of materials is very limited for the conventional trial-and-error scientific approach. Dr. Krok will give a talk about fundamental mechanisms underlying crack propagation on the interface of bilayer tablets. Additionally, roll compaction belongs to a critical unit operation in the pharmaceutical manufacture as well. In particular, during his presentation it will be shown the effect of roll speeds on the thermomechanical behaviour of powders during roll compaction and he will be discuss about the influence of feed stress on the velocity profile of a powder material along the vertical axis in the space between the rollers of a roll compactor.