



# MONASH University

Department of Chemical Engineering

## SEMINAR

### **New Perspectives on Surface Modification in Inhaler Pharmaceuticals**

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**Thursday 28<sup>th</sup> February, Building 69, Room 201  
3pm – 4pm**

**Abstract:**

The aerosolisation behaviour of fine drug particles is determined by the cohesive and adhesive forces that these drug particles experience at their surfaces. This, together with the powder flow in the device environment controls the inhalation product delivery performance. Much work has gone into studying and modifying the surfaces of the larger carrier particles, often associated with drug in ordered mixtures for inhalation. However, the carrier has very limited adhesive contact with drug, and a greater technical challenge is to control the properties of the extensive surface area presented by the micronised drug powder itself. Such should allow control of both cohesive and adhesive drug forces, and hence provide greater flexibility in formulation design, and especially in extending the range of doses that can be delivered.

In this presentation, simple strategies to surface modification of fine drug particles will be described. These approaches derive from understanding both the chemical and physical aspects of the van der Waals forces present, and modifying the surfaces accordingly. In contrast to many current approaches in this area, the work described involves modifying pre-micronised powders in a dry co-milling process: in addition, the materials created exhibited increased density as well as much improved aerosolisation efficiency. The ultimate aim is to create wide ranges of micronised drug compounds which all “look” and consistently behave the same, because a nano-layer of an additive is applied to the surface. Examples of inhaler performance optimisation will be shown, by understanding the relationship of the formulated powder within the airflows peculiar to each device selected.

The lessons learned in this approach may also be developed beyond the scope of inhaled particles, to other dosage forms or formulation concepts, and can lead to altering our view of the traditional “ordered mixture”.

*David received his BSc and PhD from Bristol University Chemistry Department. He then spent 8 years with the UK Atomic Energy Authority, developing new techniques for processing and studying aerosols, and nanoparticles. In 1997, David joined the Centre for Drug Formulation Studies, University of Bath, managing their dry powder inhaler product development programmes. In 1999, this group spun out together with VC funding into the drug delivery company Vectura Group plc, and David was appointed Head of Pulmonary Research. As well as his technology role, David lead the intellectual property activities at Vectura. He also served as coordinator of the annual “Drug Delivery to the Lung” international series of conferences from 1997 to 2007. In 2007, David left the UK to take up a Senior Lecturer position in Pharmaceutics at VCP.*

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