

Challenges in Particle Technology

Professor Mojtaba Ghadiri

Institute of Particle Science and Engineering, University of Leeds, Leeds, LS2 9JT, UK

email: m.ghadiri@leeds.ac.uk

<http://ghadiri-group.leeds.ac.uk/>

Abstract

Particulate solids form a major fraction of materials processed in the chemical and allied industries. Their discrete nature and complexities associated with their shape, surfaces, fracture and plastic deformation make reliable processing most challenging. Flowability of cohesive powders, stability (caking and segregation), tribo-electric charging, grindability, dispersion, etc., pose major issues facing practicing engineers and scientists. In some cases such as pharmaceutical powders, the challenges are exacerbated by having only small quantities of particles available at the early stages of drug development.

The approach followed by the speaker over a number of years has been based on single particle characterisation coupled with numerical simulations based on the Distinct Element Method to predict bulk behaviour. In this presentation, the research work addressing some of the above issues is outlined. In particular, dry powder dispersion, as relevant to dry particle size analysis by laser diffraction and dry powder inhalers, as well as the breakage of weak and friable powders, flowability, caking and segregation are addressed.