

Rheology of complex fluids in colloidal processing

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ABSTRACT

Colloidal processing is behind most of the traditional and advance shaping techniques in ceramics manufacturing. It also underpins the fundamental (and often not so well-known) science in a wide variety of industrial applications from food industry and personal care to additive manufacturing. Progress in this research field is driven by the need for versatile and universal approaches to build increasingly complex parts and devices. The challenge is to manipulate the rheology of ceramic suspensions as to fit specific processing techniques. Despite the relevance of complex fluids and rheology in ceramic processing, they are often not well understood; partly due to the uniqueness of each system, but also due to the lack of standard protocols to measure, compare and quantify.

This seminar will provide an overview of complex fluids, their processing, rheology and applications in ceramics manufacturing paying particular attention to direct ink writing. We will start by going back to basics, reviewing flow behaviours and viscoelasticity to then focus on how to measure and understand data using flow and oscillatory rheology. To finalise, we will discuss different systems including suspensions, emulsions, gels and 2D colloids. As an example, I will present results of our recent research on 2D colloids of graphene oxide and their role as processing enablers and rheology modifiers. The topics covered in this seminar will provide you with a starting point to better understand your system and obtain “good” rheology data.