



Topical Research Meeting on Physics in Food Manufacturing

Session: Simulation

The flow and evolution of ice-sucrose crystal mushes

R Farr¹, A Gilbert² and F Oppong¹

¹Unilever R&D Colworth, ²University of Cambridge, UK

Ice crystals, as a suspension in an unfrozen sugar syrup, are an important component of ice-creams and sorbets. These evolve over storage and must flow during production and consumption. Ice mushes also occur widely in engineering applications and in nature, for example in refrigerant systems, sea ice and cryovolcanoes. The physics of food therefore provides a model system for understanding a much broader class of materials and phenomena. Here we measure the thixotropic rheology and crystal size evolution of an ice suspension in a Newtonian sucrose solution. We are able to relate the power laws that result to the physics of cluster formation, sintering and breakup. We also find an unexpected scaling for the ripening behaviour of the crystals over long periods of time under shear.