

# **Fabrication of Novel Functional Anisotropic Microparticles for Foam Stabilisation and Structuring in Food Formulations**

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This presentation is concerned with the fabrication of novel food-grade anisotropic solid particles for foam stabilisation and applications in food formulations. Two main techniques are employed for the fabrication of these particles. Acidic hydrolysis of Nata de Coco bacterial cellulose is used to form cellulose nano-rods which are applied as a foam scaffolding material. Characterisation and modification of Nata de Coco nano-rods was also carried out. It was found that cellulose nano-rods modified with a surface layer of ethyl cellulose exhibited good foamability.

Secondly, a combination of in-shear-flow dispersion and solvent attrition techniques are employed to form micro-rods from the edible polymeric materials shellac, ethyl cellulose and zein. Characterisation of the properties of shellac, ethyl cellulose and zein micro-rods was carried out, together with assessments of their foam stabilisation ability. Stable aqueous foams were produced using shellac, ethyl cellulose and zein micro-rods as stabilisers, while ethyl cellulose micro-rods were also used to form water-in-oil emulsions.

An extension of this technique is used in the fabrication of novel functional anisotropic food-grade micro-rods with micro-particle inclusions giving altered morphology. Enhanced foamability and drainage retardation was achieved using lumpy yeast-shellac micro-rods to stabilise aqueous foams. The method was extended to the production of aqueous dispersions of ballooned micro-rods, formed by two different protocols.

This procedure also allowed the formation of novel, dual-function micro-rod capsules or 'micro-ampules' by inclusion of oils into the dispersed phase prior to micro-rod fabrication. The oils became trapped within the micro-rods resulting in micro-ampules with a range of morphologies which were characterised by fluorescence doping and microscopy.