

DEVELOPMENT OF A MILLIMANIPULATION DEVICE TO QUANTIFY THE STRENGTH OF FOOD FOULING DEPOSITS

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ABSTRACT

The process of cleaning complex food soils often involves a combination of chemical and mechanical actions, wherein a chemical reagent promotes softening of a soil layer so that it can be removed by fluid shear, jet impact or other forces. Quantifying the rheology of soil layers during cleaning is highly desirable for understanding cleaning mechanisms and developing cleaning protocols and cleaning agents. The length scales involved, of the order of millimetres needed to avoid local heterogeneities, as well as the timescales, are not always amenable to study by standard instruments. This paper reports the development of a millimani- pulation device designed for studying the removal of cohesive food soils from different substrates. The concept is derived from the use of the micromanipulation device originally developed by Zhang and co-workers at Birmingham. The device imposes a deformation (i.e. a controlled strain) and measures the force required to deform the material. The device was commissioned using a simple, viscous material, honey. Further tests were conducted on polymerised grease soils using lard, subject to different baking histories, as a model material. The effect of (a) cooking conditions and (b) protein (ovalbumin) content on soil characteristics and removal behaviour was examined. Quantifiable changes in adhesive and/or cohesive forces are observed.