DEVELOPMENT OF A SCANNING FLUID DYNAMIC GAUGE (sFDG) FOR USE IN CLEANING STUDIES

Patrick Gordon*, Y. M. John Chew, D. Ian Wilson
Department of Chemical Engineering and Biotechnology, University of Cambridge, Pembroke Street, Cambridge, CB2 3RA, UK

ABSTRACT

The removal of fouling deposits from process equipment is a chore common to many processes within the food industry. The ease with which a particular deposit can be removed depends on the cleaning conditions used (*e.g*. temperature, solvent, shear), yet it is also critically dependent on the nature of both the soil and substrate (*e.g*. material properties, surface energy, roughness).

Fluid dynamic gauging (FDG) has been developed to measure both the thickness and strength (cohesive or adhesive) of a range of fouling deposits, *in situ* and in real time. Here we report the development of the next generation of FDG device, and its application to the study of cleaning. This 'Scanning FDG' features fully automated movement across a sample surface, enabling spatial distributions of deposit thickness, and therefore cleaning behaviour, to be determined. By taking measurements at a variety of points across the deposit surface, several thickness-time profiles can be recorded over the course of a single experiment. Alternatively, different surfaces can be compared under identical conditions by using an array of coatings. This greatly increases the amount and range of information that can be obtained from a single experiment, thereby reducing the number of tests required to assemble data sets.

Here, we apply scanning FDG to study the strengths and cleaning kinetics of model food soils on a range of surfaces. The relationship between the surface characteristics (*e.g*. surface energy, roughness) and the attachment behaviour are demonstrated. Application of these results to cleaning-in-place operations are discussed.