EPSRC supported EngD: Development and Optimisation of Cleaning-In-Place (CIP) Process for Razor Blade Production

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Tax free bursary of £ 28,505 per annum plus fees paid.

Project Description:
Razor blade is an indispensable device in nearly all households, with a market size of approximately 13.7 Billion USD. At Gillette, over six billion blades are produced every single year, serving over 750 million people around the world.1 The aim of this project is to develop and optimize a suite of Cleaning-In-Place (CIP) processes for razor blades post sharpening process. This involves advanced surface characterisation techniques, CIP process optimization, product evaluation, which closes the feedback loop in driving the sustainability profile of the cleaning process.

Building upon a set of previous work by our group concerning surface cleaning,2,3,4 the project has the following objectives: i) to develop novel cleaning technologies in removing oil and debris from stainless steel blade; ii) to develop CIP process for the cleaning technologies validated at lab and pilot scales; iii) to establish quantitative relationship between cleaning strategies, CIP process, and cleaning effectiveness; iv) to make recommendations on the future CIP process.

Working closely with the industrial partner P&G, the EngD candidate will develop a wide range of skills in product development, process optimisation, and performance evaluation, establishing a broad appreciation of Formulation Engineering. They will develop a portfolio of transferrable skills such as project management, communication, and team working, which ensures excellent employability upon completion of the project. If you have a background in Chemistry, Physics, or Chemical Engineering and are passionate about driving sustainability for chemical industry, this is an excellent opportunity.

References:

1. https://www.gillette.co.uk/blog/shaving-science/gillette-plant-berlin/
2. A. Avila-Sierra, H.A. Huellemeier, Z.J. Zhang, D.R. Heldman, and P. Fryer “Molecular Understanding of Fouling Induction and Removal: Effect of the Interface Temperature on Milk Deposits” ACS Appl. Mater. Interfaces. 13 (2021) 35506
3. A. Avila-Sierra, Z.J. Zhang, and P. Fryer “Effect of surface roughness and temperature on stainless steel - whey protein interfacial interactions under pasteurisation conditions” J. Food Eng. 301 (2021) 110542
4. A. Avila-Sierra, R. Montoya-Guzman, Z.J. Zhang, P.J. Fryer, and J.M. Vicaria “Cleaning performance of stainless steel surfaces fouled with preheated starch-protein binary mixtures: Mechanical properties, removal mechanisms, and in-place cleaning” J. Food Eng. 384 (2025) 112257

Funding Details:
To be eligible for EPSRC funding candidates must have at least a 2(1) in an Engineering or Scientific discipline or a 2(2) plus MSc.

For details on the Engineering Doctorate scheme visit the homepage.