

The PODDS project has been leading international discolouration research in water distribution systems since 2001. As the single biggest source of customer contacts related to drinking water quality, discolouration studies undertaken exclusively at the University of Sheffield

PODDS

Managing Discolouration Risk and Impact

Prediction of Discolouration in Distribution Systems

has developed, validated and applied a novel conceptual approach to understand the causes. This has led to new operational and management strategies and has seen the development of the PODDS model for the *Prediction and Of Discolouration in Distribution Systems*. Rather than considering gravity driven sediment transport processes, as in river or sewer environments, PODDS considers the build-up of discolouration material on pipe walls as cohesive layers and describes how these layers interact with hydraulic conditions to dictate material behaviour.

In 2015 the PODDS V project ended that had proposed to “*extend the world leading knowledge and the application of validated tools for managing discolouration, encompassing the processes that govern the generation of material layers within distribution systems acknowledging the key role of biofilms*”. It successfully brought together multiple researchers and themes with key scientific knowledge derived from nationally coordinated trials and laboratory studies. This has resulted in significant operational cost savings and effective strategies improving asset performance and delivered customer water quality. The importance of this work and the impact has been recognised academically, by water practitioners internationally and the UK Drinking Water Inspectorate (DWI).

This work has only been possible with the support of project members helping organise trials in live networks. These have consistently demonstrated the hydraulically manageable and PODDS predictable discolouration behaviour. During this phase support from Dwr Cymru Welsh Water, Northumbrian Water, Scottish Water, Severn Trent Water, United Utilities and Wessex Water has been invaluable. The project has shown the key role of biofilms in discolouration processes (see figure 1) with ongoing field and laboratory studies using the unique test facility at the University of Sheffield investigating the impact of chlorine residual. The importance of water quality, and therefore water treatment processes, has been emphasised with metal and turbidity relationships correlating to known discolouration risk. These findings confirm that for long term discolouration management, an holistic approach is required that includes water treatment, health considerations and factors that impact water quality, such as network configuration, reservoirs, disinfectant residuals and of course hydraulic operation!

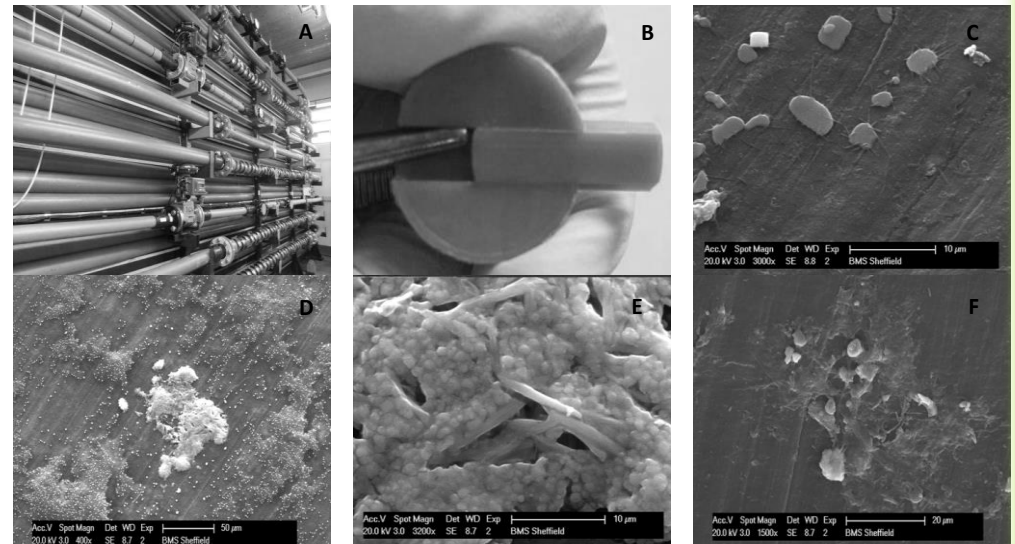
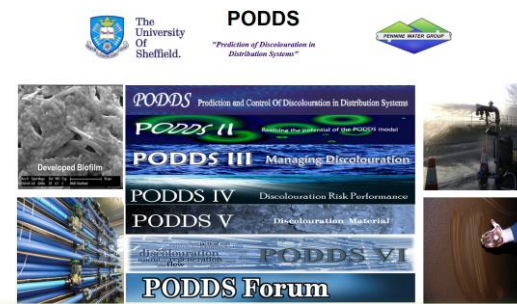


Figure 1 PODDS laboratory pipe loop at the University of Sheffield with specialised coupon and scanning electron microscopy images of developing biofilm. *Microscopy images courtesy of BMS Imaging Facility, University of Sheffield. Scale bars as indicated a) 600 m full scale temperature controlled pipe facility, University of Sheffield, b) Coupon for simultaneous analysis of in-situ biofilm formation and community structure, c) Primary attachment including inorganic material, d) 28 day biofilm development, e) Developed biofilm and f) Inorganic incorporation. (S. Husband, I. Douerelo, K. Fish, J. Boxall (2015) 'Biofilms and Discolouration Material Accumulation Processes in Drinking Water Distribution Systems and Modelling the Hydraulic Mobilisation' IWA Specialized Conference Biofilms in drinking water systems, Switzerland August 2015)*



www.PODDS.co.uk

Prof. J. Boxall

Email: j.b.boxall@sheffield.ac.uk

Dr. S. Husband

Email: s.husband@sheffield.ac.uk