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## LABORATORY AND FIELD TESTING OF ANTIFOULING BIOCIDES TETHERED TO ORGANIC POLYMER COATING COMPONENTS AGAINST MARINE BIOFILMS

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Marine biofilms which are often referred to as microfouling, remain unaffected by the current antifouling technologies utilised in shipping. The mechanistic understanding of biofilm adhesion is largely unexplored especially on antifouling surfaces that utilise a range of different strategies from chemical repulsion (e.g. biocide-based coatings) to physical removal (e.g. foul release coatings). Environmental concerns on the fate of biocides entering the environment when released from coatings have generated an imperative need for active but non-leaching surfaces. For this reason, the European FP7 project Foul-X-Spel has investigated covalently fixing bioactive molecules (commercial biocides) to avoid leaching and to promote a long-term effect of surface protection.

Here we report the initial results from both laboratory and field experiments where two approved commercial biocides have been covalently linked to components of polyurethane (PU) surface coatings. Initially, the new compounds were tested in solution (0.5 ppm – 256 ppm) against the marine biofilm forming bacterial species *Cobetia marina* and *Marinobacter hydrocarbonoclasticus* in the laboratory via attachment and growth assays. Following the initial bioassays, the biocide linked paints were applied on to glass coupons, placed in 24-well plates and tested against biofilm growth over 24 hours against the aforementioned species. The bioassay protocol has been developed in order to allow *in situ* observations of biofilm formation and growth, by corroborating different techniques such as a multidetection microplate reader and confocal laser scanning microscopy (through nucleic acid staining). The coatings containing the linked commercial biocides (up to 5 %) have been immersed as part of field trials in the UK (Southampton Water) and Singapore for eight weeks.

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