New characterization methods in Low Emission AntiFouling coatings development

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LEAF formulators have to choose paint components based on know-how and experience to match the special features and characteristics such an AF-approach required. The LEAF concept requires a paradigm shift in antifouling coatings design. This is one of the most challenging parts of the Project.

The chemical, physical and mechanical properties sought for in this kind of AF are described in the literature (Pinori et al. 2011, Pinori et al. 2013), and how to monitor them in real life is described in the following paragraph.

Important is to achieve a homogeneous distribution of the components and biocides in the paint, as this is believed to be the crucial part in the antibarnacle efficacy.

In order to obtain this, studies on interactions including matrix/biocide and biocide/biocide have been conducted prior the selection of paint components. The final distribution has been monitored by Fluorescence Microscopy, SEM, EDX, Raman Spectroscopy andToF-SIMS. The distribution of these components influences both efficacy, life time and biocide release rate.

As described in (Pinori et al. 2013), paint erosion can be minimized without influencing the efficacy of LEAF paint. This will enhance the life time and reduce cost and impact on environment. This is monitored with a rotating disk setup shown in the picture.

The post-penetration intoxication of barnacles requires a fine control of the final hardness of the paint film (Pinori et al. 2013). This is monitored by the Buchholz indentation resistance on the dry film.

LEAF project demonstrate high AF efficacy with a tin (Sn) and copper (Cu) free formulation while maintaining the production costs below or at the same level as for commercial copper containing paints.

ISO 15181-1 standard release rate method, LCA, LCC, MAMPEC emission scenarios, human exposure studies are showing the advantages in using this approach instead of the actual copper containing solutions present on the market.

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