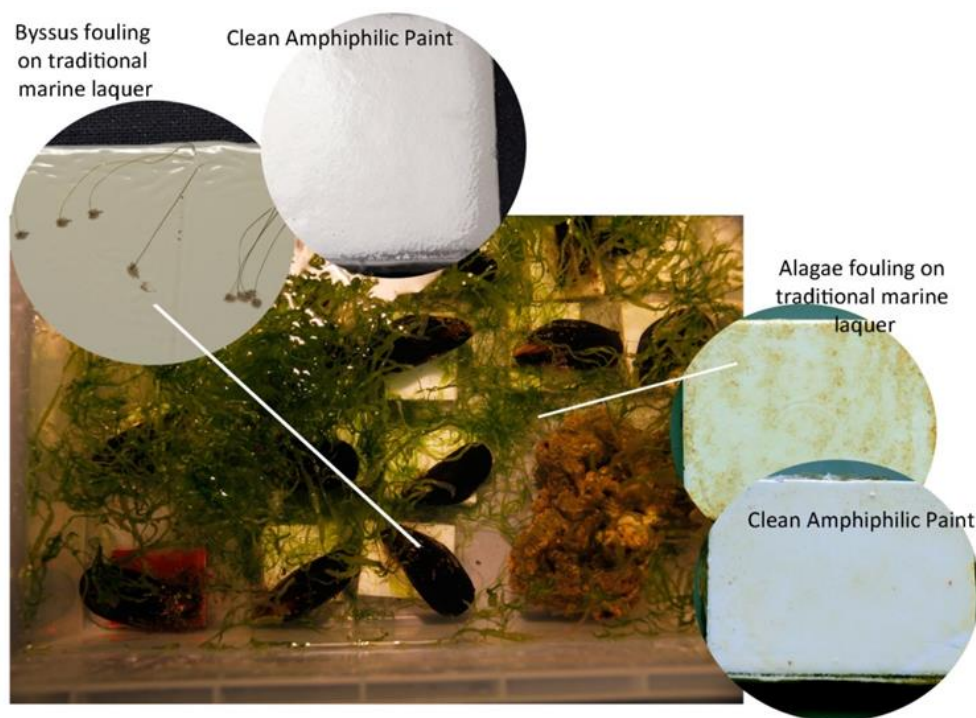


### **“Paint-it” project: eco-friendly anti-fouling marine paints.**

Within the framework of “Life” European call, the proposals of the “Paint-it” project represent a step forward in the preservation and protection of marine ecosystems. The manufacturing of an anti-fouling paint, based on the concept of amphiphilic behaviour of a surface, would indeed allow the maintenance of clean and efficient hulls without the release in the environment of noxious substances such as copper and tin ions. Marine species are capable of attaching to surfaces through the secretion of a gluing substance characterized by a particular 3D structure at molecular level. The amphiphilic surface features characteristics that are able to counteract the capability of the marine species to adapt their “gluing secretions” to specific surfaces with determined properties of hydrophilicity or hydrophobicity.

The research group of the University of Rome “Tor Vergata” explored and designed so far several options that would reproduce such structure. In particular, the modification of a polysiloxane-polyester resin, commercialized as raw material for marine application, was successfully achieved by the addition of extremely hydrophobic and hydrophilic molecules to the resin structure through easy reaction routes involving the chemistry of silanes. Alternatively, coating materials were obtained by the even easier reactive process of a quasi-hydrophilic polysiloxane-polyester resin and a hydrophobic polyurethane hardener, or, alternatively, a mixture of hydrophobic and hydrophilic polyurethanes.

Preliminary studies conducted so far evidenced the effectiveness of the proposed strategies for the manufacturing of painting products, featuring good release properties to sticky protein substances (albumin of egg-white), and good overall anti-fouling activities when immersed in a simple replicated marine eco-system (Fig. 1). All coating products developed consist in 2pack preparations suitable for conventional spraying process. After application, the paints easily air dry, showing a dust free time of 6 h. The materials are clear coats and can be deposited as single layer products, directly on epoxide mineral primers. At present, the coating materials are designed with two different finishes: gloss and matt. Mechanical characterization emphasized excellent adhesion properties and an optimal wear and scratch resistance, showing an extraordinary improvement with respect to commercial products based on purely silicone preparations.



**Fig. 1** Effectiveness of newly developed antifouling coatings against mussels and algae.