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Preliminary evaluation of antifouling properties of high temperature ceramic glaze coatings in marine environment

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This work presents some preliminary results concerning the assessment of antifouling properties of high temperature ceramic glaze coatings in marine environment. As traditional antifouling measures, such as toxic coatings, are a threat to marine biodiversity because of the toxic releases that affects marine organisms and represents a direct source of marine pollution, the use of new materials and strategies to approach the problem is needed.
High temperature ceramics presents some remarkable technical properties such as hydrophobicity and low roughness coefficient. These characteristics, combined with others such as the very high resistance to wear, the chemical inertia and the very low coefficient of electrical conductivity, have made ceramic a material widely used in various fields of technical and scientific application.
The original idea for the current research comes from suggestions related to the historical-artistic-artisan aspect from which this material has had its origins with reference to deductive observations centered on the state of conservation of some artefacts found and recovered from ships wrecks, sunk in different eras and lying at different depths in the sea, along the trade routes connecting the far east with the west.
Attention was focused on this last step; it has been noted how the artefacts have remained immersed in the sea for decades and, for the most part, for centuries, have been recovered to the original beauty with extreme ease, removing, without excessive difficulty, sediment and encrusting organisms.
To perform a preliminary test of antifouling properties of high temperature glazes coatings, five tiles of 14 cm x 7 cm were placed in the coastal area of Civitavecchia (Northern Tyrrhenian Sea, Italy), at a depth of 1 m. Half of the surface of each tile is covered with glaze of different composition. The tiles were placed in a structure fixed with a buoy.
The tiles were left in water for 50 days during which periodic photographic surveys were carried out to macroscopically evaluate the fouling progression. At the end of the 50 days the structure was taken to the laboratory, the tiles were dried and the surface occupied by the fouling was quantified. Preliminary results show that each glaze has a significant fouling reduction compared to unglazed areas and that different glaze chemical composition clearly influences the fouling progression, suggesting a not only physical effect in the antifouling properties of the glazes used.
The obtained results shows that the use of high temperature glazes could represent a promising approach for the study of new antifouling materials with short-term application possibilities in oceanographic measurements, contributing to the preservation of the marine environment.