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Functional Ecofriendly Coatings for Marine Applications

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The worldwide increasing number of off-shore wind turbines brings along the need for innovative polymer coatings which on the one hand can withstand the extreme forces acting on the rotor blades and on the other hand can provide adequate antifouling properties to counter biocorrosion of the basement. The development of environmentally friendly and commercially realizable coating systems is most important since the prohibition of tributyltin (TBT)-based antifouling coatings in 2008. In this study an alternative polymer/particle composite coating based on polythiurethan (PTU) with tetrapodal shaped ZnO (t-ZnO) as additive is investigated with respect to chemical, mechanical and antifouling properties. Overall, four different composites with filler amounts of 0 wt% t-ZnO, 1 wt% t-ZnO, 5 wt% t-ZnO, 10 wt% t-ZnO were tested. Preliminary antifouling experiments were carried out under artificial habitat conditions at an aquarium, imitating Pacific Sea water. For mechanical and chemical characterization tensile tests, adhesion tests and contact angle measurements were performed. An optimum of mechanical and antifouling properties were found for a filler amount of 5 wt% t-ZnO in PTU.