

## PHOTOCATALYTIC ANTIBIOFOULING NANOCOATING FOR MARINE AND FRESH WATER ENVIRONMENTS

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**B**iofouling is a natural process that involves accumulation of microorganisms, plants, algae, or animals on a surface that is in contact with an aqueous environment. Biofouling is typically a multistage process, which usually starts with organic or molecular fouling – accumulation of macromolecules, like proteins and carbohydrates, from water, which further leads to the attachment of microbial cells. Although the process is natural, it has plagued many industrial sectors, such as shipping industry, aquaculture, desalination and even oil-refineries by resulting in surface corrosion costing them billions of dollars yearly to overcome it. There have been numerous efforts to prevent biofouling that have been made with varying success rates till date. These typically includes protecting the surface with wax type materials, standard paints, chemical antifouling coatings as well as introduction of toxic biocides such as tributyltin (TBT) containing compounds as surface coating. When the introduction of toxic biocides helped the industries to prevent the biofouling up to certain degree, at the same time it has started to affect the aquatic ecosystem as well making the use of biocides an environmentally serious issue. In our research we are addressing this issue by developing environment friendly antibiofouling coatings based on biocompatible photocatalytic nanomaterials. Our approach is simple and can be easily up-scaled. Using metal oxides, such as zinc oxide (ZnO) and titanium dioxide (TiO<sub>2</sub>), we have developed nanoscale coatings and tested their antibiofouling properties in both marine and fresh water environment. Compared to the commercially available copper based antifouling paints, our coatings have shown better antibiofouling properties and more durability. Experiments conducted in real world suggest that these photocatalytically active nanocoatings can be a potential alternative to the commonly used toxic antibiofouling paints for the prevention of biofouling in aquatic environment.

## BIOGRAPHY

Tanujjal Bora is a Faculty in Nanotechnology field in Asian Institute of Technology, Thailand. He has completed his doctoral degree in Nanotechnology in 2012 from AIT, Thailand and then joined the Chair in Nanotechnology Research Group at Sultan Qaboos University, Oman as a post-doctoral Researcher. His major research interest is on nano-engineered materials for solar energy harvesting and environmental applications. He has more than 30 international journal publications with citations over 750 and h-index of 15.

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