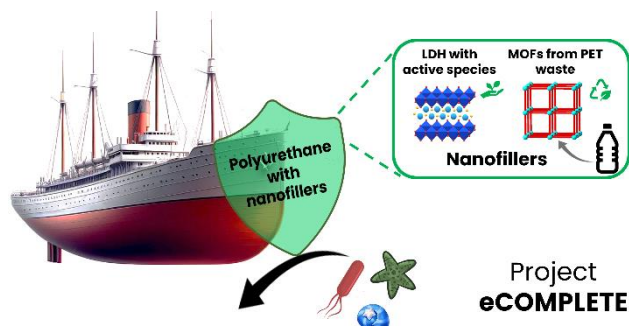


## Eco-friendly MOFs and LDHs nanofillers for polyurethane based antifouling coatings (Acronym **eCOMPLETE**)

**Marine biofouling** representing undesirable deposition of marine organisms on the surface of structures, causes great harm to marine ships and offshore facilities. It causes severe environmental pollution and huge economical loss, which is estimated as \$150 billion annually. Preventing the accumulation of fouling organisms diminishes these issues and can mainly be achieved via application of **antifouling coatings**. However, most of traditional antifouling coatings are based on toxic materials, (e.g. biocides or toxic metal ions), which permanently release in the environment and can cause serious harm also to non-target organisms. Due to these reasons development of novel eco-friendly coatings with long cycle and controllable release is in exceptional needs.



In frame of the project **eCOMPLETE**, scientists from Helmholtz-Zentrum Hereon and Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM will develop new antifouling coatings based on polyurethane, which will be loaded with **eco-friendly** and/or **sustainable** nanofillers with an ability to release on demand.

Polyurethane coatings are known for their good mechanical properties and low toxicity. In turn, as nanofillers, **metal organic frameworks** (MOFs) and **layered double hydroxides** (LDHs) with remarkable antifouling performance will be in focus. The exceptionality of both LDHs and MOFs consists in their nanocontainers ability, i.e. they can store and controllably release antifouling and inhibitive species on demand, but *not permanently*. MOFs, materials with multiple functionalities, consist of metal cations connected by organic linkers. The project targets to develop sustainable MOFs nanofillers using linkers from **PET plastic waste**. Additionally, to MOF, eco-friendly LDHs nanofillers will be developed. LDHs belong to the class of eco-friendly anionic clays, which thanks to their high ion-exchange ability will be loaded with active antifouling, e.g. indole or furane based compound.

The successful implementation of eCOMPLETE will be achieved through close collaboration between groups with expertise in MOFs and LDH nanocontainers (Hereon) and preparation/application of paint coatings (IFAM). Huge benefit is the availability of own maritime test sites for testing of antifouling properties in real environmental conditions (IFAM). At the end of the eCOMPLETE project, a novel eco-friendly polyurethane coatings loaded with nano-container based fillers will be created, which expect to be:

- ✓antifouling with controllable and slow release of active agents;
- ✓highly corrosion protective;
- ✓sustainable and environmentally friendly due to involvement of eco-friendly compounds from natural or recycled resources.