

Nanoparticles in antifouling paint: an ecological solution?*Nathalie Deleuze, Ladislav De Meulemeester, Jacques Mansuy**Antwerp Maritime Academy**Noordkasteel Oost 6**2030 Antwerp, Belgium*Corresponding author E-mail: ladislav.demeulemeester@mil.be

Fouling is a major problem in the shipping industry because it increases the drag of the ship, the fuel consumption and consequently the CO₂ emission. Fouling can consist of slime, algae and/or macro fouling like mussels, barnacles or crabs.

To avoid this accretion, antifouling paints cover the immersed parts of the hull. They prevent or limit fouling by using different techniques. Each constructor and developer uses his own formula. One of these methods adds nanoparticles to the top layer coating.

Nanoparticles are inorganic materials with a size ranging from 1 to 100 nanometres. They are essentially microscopically small crystal structures intentionally produced to repel micro- and macro fouling without having to resort to active biocides which are chemical active substance designed to destroy or eradicate or repulse harmful species.

Some examples of nanoparticles being used are: copper, silver, silicon dioxide, titanium dioxide. These products inhibit the development of nascent growth on submerged surfaces by producing an acid in contact with water or thanks to antimicrobial properties. Next, slipstream washes the remaining fouling away.

The main advantage of nanoparticles is that they seem to be eco-friendly compared with other antifouling paints on the market. However, initial studies indicate some bioaccumulation. These preliminary results are not certain yet due to the very active evolution of this technology. The findings of these studies also suggest that that human health may be affected by inhalation of nanoparticles.

In general, therefore, it seems that the new type of antifouling paint using nanoparticles is a good alternative to common paints. Nevertheless, there is some reserve concerning the bioaccumulation and the effects on little organisms after a long-term utilisation.