CLEAN SHIPPING

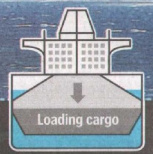
Ships are a major source of global warming pollutants, contributing about 4 per cent of the world's carbon emissions. Environmental protection is the focus at this year's Singapore Maritime Week, which starts today. GRACE CHUA looks at some local clean technology projects for the shipping industry.

TREATING WASTEWATER

Dr Wong Fook Sin from Nanyang Technological University's Institute of Environmental Science and Engineering has developed a membrane bioreactor system to treat shipboard wastewater, which uses thin, flexible membranes to filter the pollutants from the water. The two-tank system is so self-contained – it uses one tank to treat wastewater and another to treat the residue left over from water treatment – that it generates almost no waste and saves up to 80 per cent of the space taken up by a conventional wastewater treatment system. Trials will take place on land over the next two years before the system is sent out to sea.

SOLAR CELLS

Imagine if solar cells were flexible enough to be wrapped around a ship's curved surfaces. This could help provide energy to power the vessel, and be cleaner than conventional fossil fuels. Dr Darren Sun from NTU has developed just such a technology, where solar cells are made of titanium-dioxide nanotubes – tiny tubes the thickness of molecules, infused with a dye which harvests energy from sunlight. Eventually, he hopes that sheets of the cells can be fixed on walls, roofs and other surfaces. But commercialisation is still some way off. Right now, the cells can convert only 3 per cent of the sunlight they receive into electricity.



Ballast water is discharged at destination port along with chemicals used to kill organisms

BALLAST-WATER TREATMENT

Ballast water – tanks of water used to keep ships stable when they are not laden with cargo – can often harbour stowaway marine organisms like algae and plankton. When the water is pumped out at the ship's destination, the organisms go with it, and can establish themselves as invasive species in their new environment. Current methods of treating ballast water kill organisms with chlorine or other chemicals, but these could leave toxic chemical residues. NTU's Dr Wong and the Institute of Environmental Science and Engineering are developing a method to kill these organisms with powerful hydroxyl radicals, molecules generated when an electric current is passed through the water. These molecules break down much faster than others, leaving only clean water after they do their work.

ANTI-FOULING COATING

Biofouling happens when marine organisms like barnacles and bacteria colonise the undersides and surfaces of ships, causing drag through the water and the risk of introducing invasive species to other ports. Most anti-fouling coatings contain heavy metals that pollute the environment and accumulate along the food chain. But Dr Serena Teo from the Tropical Marine Science Institute, National University of Singapore, and Dr Christina Chai from A*Star's Institute of Chemical and Engineering Sciences have come up with a non-metallic, biodegradable paint additive that uses small organic molecules to prevent marine organisms from clinging to ships, without polluting the environment. They expect to develop a paint with the additive by the end of this year.

PHOTOS: NTU and ST FILE PHOTO