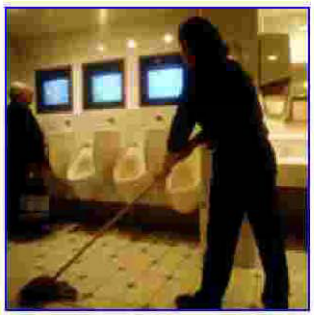
ABC Online

Scientists ponder self-cleaning bathroom. 23/01/2006. ABC News Online

[This is the print version of story http://www.abc.net.au/news/newsitems/200601/s1553066.htm]

Last Update: Monday, January 23, 2006. 12:00pm (AEDT)



Researchers think nanoparticles could also be used to improve outdoor self-cleaning surfaces too. (Getty Images)

Scientists ponder self-cleaning bathroom

By Science Online reporter Anna Salleh

Cleaning bathrooms could become a chore of the past with new coatings on bench surfaces, tiles and glass that do the job for you, Australian researchers say.

University of New South Wales Professor Rose Amal, of the ARC Centre for Functional Nanomaterials and her team, are developing new coatings they hope will be useful for self-cleaning surfaces in homes and hospitals.

"If you can have self-cleaning materials, you can do the job properly without having to use disinfectants and other chemicals," Professor Amal said.

Tiny particles of titanium dioxide up to 20 nanometres in diameter are currently used on outdoor surfaces, such as self-cleaning windows.

These titanium dioxide nanoparticles absorb UVA light, ultraviolet light below 380 nanometres in wavelength.

This excites electrons and gives the particles an oxidising ability more powerful than chlorine bleach.

The nanoparticles can then kill microbes and break down organic compounds from vehicle and industrial emissions into carbon dioxide and water.

Surfaces coated with the titanium dioxide nanoparticles also have another property, called "superhydrophilicity" that helps them self-clean.

This is when water does not form droplets, but rather runs straight off the surface, washing as it goes.

But titanium dioxide can only be activated by UVA and this is only present in sunlight, not

other sources of light, like indoor light.

This means that to date self-cleaning coatings have been limited to outdoor surfaces.

Professor Amal and her team have been modifying titanium dioxide nanoparticles so they can absorb light at higher wavelengths, in the visible spectrum, over 400 nanometres in wavelength.

They have been doping titanium dioxide nanoparticles with a small amounts of other elements such as iron or nitrogen, in place of titanium or oxygen.

Lab trials show that glass coated with the new nanoparticles can be activated by visible light from a lamp to kill bacteria Escherichia coli, and degrade volatile organic compounds.

"If you can coat it onto a shower room, you don't have to clean the shower room that often," Professor Amal said.

"Because of the oxidising properties, fungus will also not grow on the surface."

While Professor Amal says the self-cleaning coatings would be useful on tiles, glass screens and benches in bathrooms and hospitals, she says the nanoparticles could also be used to improve outdoor self-cleaning surfaces.

She says UVA only makes up 5 per cent of sunlight, whereas the ability to use visible light would significantly increase the amount of sunlight that could be used.

"If you use this material outdoors you can utilise more of the sunlight wavelengths," she said.

Funding so far has been through the Australian Research Council (ARC) but Professor Amal says her team will be looking for commercial support down the track.

She expects it will be another year before the nanoparticles will be ready for large-scale production.

She says recent concerns about the toxicity of nanoparticles should not apply to those in the self-cleaning coatings because they are chemically glued to surfaces with polyethylene glycol, and so are not free to float in the air.

"For this particular application I don't think it should be a problem," she said.