

Liquid glass could sanitise the world

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IT SOUNDS too good to be true: a non-toxic spray invisible to the human eye that protects almost any surface against dirt and bacteria, whether it is hospital equipment and medical bandages or ancient stone monuments and expensive fabrics.

But true it is. The spray is a form of "liquid glass" and is harmless to living things and the wider environment. It is being touted as one of the most important, environmentally-friendly products to emerge from the field of nanotechnology, which deals in objects at the molecular end of the size scale.

Tests have revealed an astonishing variety of potential uses for the liquid glass, from protecting vineyards against fungal attacks, to coating medical implants with non-stick, antibacterial surfaces. Scientists have even used it to spray fabric with an invisible, dirt-resistant film.

The secret of liquid glass is that it forms an ultra-thin film between 15 and 30 molecules thick – about 500 times thinner than human hair. On this nanoscale –

a few millionths of a millimetre thick – liquid glass turns into a highly flexible invisible barrier that repels water, dirt and bacteria, yet is resistant to heat, acids and UV radiation – and remains "breathable".

A family-owned German company called Nanopool holds patent rights on the technology behind the liquid glass, which emerged from research at the Institute for New Materials in Saarbrücken.

Nanopool is already talking to British firms and the National Health Service about using the product for a diverse range of applications, from coating designer handbags to spraying the nose cones of high-speed trains and the interior of carriages.

An NHS hospital in Southport, Lancashire, has just completed a year-long trial where a variety of surfaces were coated with liquid glass to test its ability to resist dirt and microbial growth. The results are expected to be published next month.

Similar tests by food-processing firms in Germany have shown that sterile surfaces treated with liquid glass are just as clean and free of mi-

crobial contamination after being washed in hot water as untreated surfaces washed in the usual way with strong bleach, and the antimicrobial effect continued over many months.

The liquid glass is composed of almost pure silicon dioxide, the chemical constituent of quartz or silica, the most abundant mineral in the Earth's crust. It is quite inert and has no known harmful impact on the environment, unlike many of the domestic and industrial cleaning products its use could help to reduce.

The "easy-clean" properties of the liquid glass could lead to drastic cuts in the amount of potentially toxic cleaning agents used in factories, offices, schools, hospitals and the home, as well as cutting the costs of labour and the amount of time spent scrubbing surfaces.

It works by forming a highly water-repellent or "hydrophobic" layer that resists dirt and bacteria, so that treated surfaces can be quickly washed clean with plain water, said Neil McClelland, Nanopool's UK project manager.

"Many UK super-markets are unwilling



SHATTERING CLEANING CONVENTIONS: A new "liquid glass" composed of almost pure silicon dioxide, which has been developed and patented by a German nanotechnology firm, can repel germs from a multitude of surfaces.

to stock the technology as many other cleaning products they sell will become redundant.

The secret of the glass's properties lies in the way it is manufactured so that it can be sold in a solution of water or alcohol, depending on the type of surface to be covered.

When sprayed on a surface, the glass solution forms a flexible, ultra-thin film that generates strong electrostatic forces that bind it to the material in question, yet repel water from the opposing, exposed surface.

"In essence, we extract molecules of silicon dioxide from quartz sand and add molecules of water or ethanol

depending on which surface is being coated.

"The really clever part is that there are no added nano-particles, resins or additives – the coatings form and bond due to quantum forces," said McClelland.

When bacteria or other microbes land on the glass surface they are not killed, but they cannot divide and replicate easily, he said. This imparts a natural, antibacterial property to the layer of liquid glass similar to the silver-ion surfaces used to protect some kitchen equipment, but with a longer-lasting effect.

"Very soon almost every product you purchase will be protected

with a highly durable, easy-to-clean coating... the concept of spray-on glass is mind-boggling," McClelland said.

Sprayed on outdoor stone or brick, the liquid glass creates a water-resistant easy-to-clean surface. It allows the stone to breathe, preventing a build-up of mildew.

Graffiti is more easily removed from treated surfaces, without the unsightly "shadowing" of conventional anti-graffiti treatment.

Britain's war graves organisation, Alrewas, is in discussions with Nanopool about treating its stone monuments.

Sascha Schwindt, MD of Nanopool, said that agricultural compa-

nies were also interested in liquid glass as a treatment against fungal attack on plants and seeds.

Vineyards are testing it against a common grape fungus and wine makers are interested in using the product to prevent "corking".

Schwindt said tests had also shown that seeds sprayed with liquid glass are not just protected against fungal attack, but germinate and grow faster than untreated seeds.

"We think it's because the energy of the seeds is used for development and growth rather than defence against bacteria and fungi in the soil," he said. – The Independent