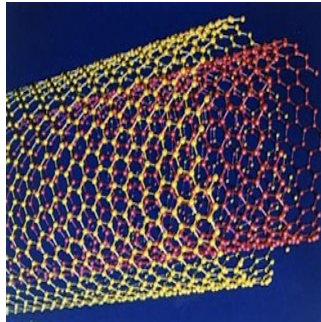


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## Nanotechnology to Fight Hospital Superbugs



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Each year, twice as many people die in Europe from hospital acquired infections than from road accidents. These infectious diseases have developed antibiotic resistance and spread despite the best efforts of staff, mainly through textiles like bed linen. But the technology developed by a European research project helps fight back against the so-called superbugs, by using a revolutionary nanotechnology to treat bed linen and other textiles.

The European Nanobond consortium consisted of six companies and two scientific partners. It developed durable antimicrobial textiles with a polymeric coating in the nano range thickness – in other words, of a few layers of polymeric molecules. The textiles have been clinically tested to withstand industrial-strength laundry cycles, and the treatment lasts for the entire lifetime of the product.

The technology is all the more timely since the role of textile surfaces as ubiquitous hosts to bacteria was underestimated until recently, when it was assumed a wash alone would disinfect. But, even in the journey from laundry to the hospital, there are all sorts of opportunities for new infections.

The World Health Organisation (WHO) now warns that textiles act as a microbial harbour for superbugs. In the Netherlands, 6.6% of all patients catch a hospital acquired infection (HAI); France now reports 750,000 HAI cases a year, and Germany puts the annual cost of fighting HAI at €2.5 billion. New born children, the old and the weak are the most vulnerable to them.

Yet Nanobond has shown the superbugs can be beaten. “We proved that even in bacteria rich environments, these anti-microbial textiles will resist, and not spread the infections,” says Nanobond project coordinator Patrice Vandendaele, from Belgium-based Devan Chemicals, one of the firms involved in the project consortium.

Vandendaele said Nanobond sought to develop easy-to-clean textiles that last long, use few chemicals, keep patients healthy and avoid cross-contamination. The breakthrough came when the consortium discovered a molecule that sticks to other molecules. “This molecule was helping organise the antimicrobial molecules, so they would glue better to the surface of the textiles,” Vandendaele says.

The antimicrobial surface effectively acts physically rather than chemically. It has two distinct parts: a glue system to attach to the textiles, and an antimicrobial part to pierce the membrane of any bacteria cell that it touches. “It works like a spike bursting a balloon,” says Vandendaele. “While other antimicrobials give bacteria time to adapt, this kills it immediately.”

Both natural and artificial fibres can be treated. And the application itself is a simple dip in a bath followed by drying and curing. Nanobond’s tests show that it kills 99.99% of all micro-organisms after the first treatment, a figure that stays as high as 90% even after 70 washes.

And once the application attaches to textile, it does not leach out into the environment. Nor does it attack good micro-organisms on the skin that help protect people. It only kills what lands on the textiles. “It also means that articles treated with the new technology will have a longer natural lifetime through protection against damage and spoilage,” Vandendaele says.

The project, backed by a European Union (EU) grant of € 1.68 million, ran for three years from September 2009 to August 2012. Now the businesses involved in the consortium are promoting products under a common brand, Maedical. Their goods range from bed sheets to hospital gowns, socks, mattress protections, bandages, upholstery and carpets.

### Project details

Project acronym: Nanobond

Participants: Belgium (Coordinator), Hungary, Germany, United Kingdom, Slovenia, France, The Netherlands

Project FP7 228490

Total costs: €2 212 840

EU contribution: €1 678 871

Duration: September 2009 - August 2012

Source: <http://ec.europa.eu/research/infocentre>

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