New antibacterial fabric could revolutionise infection control

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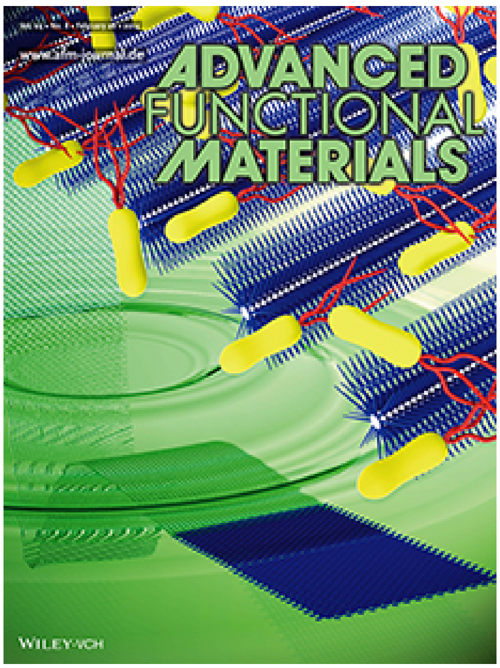

RMIT research made the cover of the prestigious journal *Advanced Functional Materials*.

(Phys.org) —RMIT researchers have developed a new antibacterial fabric that can kill a range of infectious bacteria, such as E coli, within 10 minutes.

The discovery could significantly reduce the risk of deadly hospital-acquired infections and revolutionise the way the medical industry deals with infection control.

Secondary infections are a serious and potentially deadly complication for hospital patients.

Antibacterial fabrics do not allow nasty disease-causing bacteria, like Staphylococcus, to stick to and grow on their surface - creating an infection-free environment.

Associate Professor Vipul Bansal from RMIT University's School of Applied Sciences, who leads the NanoBiotechnology Research Laboratory team, said fabrics with the built-in ability to fight bacteria could relegate hospital-acquired infections to the sidelines.

"There is potential for special bedding, linens and surgical aprons on which bugs and bacteria do not grow, so we can maintain an infection-free environment in our healthcare settings," he said.

"We may also have dressings and Band-Aids that can kill bacteria in the wound, resulting in faster healing. These will all have a major impact on the cost of the Australian healthcare system."

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Associate Professor Bansal said the new antibacterial fabric will have important environmental and clinical applications.

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The next generation of smart textiles will be free from bacteria and odour and have a range of potential applications from clothing - putting an end to smelly socks - to sporting gear and uniforms.

For the past year, Associate Professor Bansal and his team, including PhD candidate Zahra Homan, worked with CSIRO scientists on the project.

They found organic materials with semi-conductor properties can have superior antibacterial effects over metal salts of silver which are already known for their antibacterial properties.

To test the concept, they grew nanowires on fabric which confirmed the antibacterial properties of Ag-TCNQ (tetracyanoquinodimethane).

The results were recently published in the prestigious journal *Advanced Functional Materials* and featured on the journal's cover.

"It has been known for the last hundred years that silver is anti-bacterial," he said.

"Silver metal, when it comes into contact with body fluids, releases silver ions and these ions are actually toxic and have anti-microbial and antibacterial properties."

Instead of using silver metals, Professor Bansal and his team developed a new material called silver TCNQ, which releases silver ions very slowly for a long-term antibacterial effect.

In another project, the NanoBiotechnology Research Laboratory team is working with nanoparticles of different sizes, shapes, compositions and surface coatings to test their ability to destroy different bacteria.

A nanoparticle is a very small particle where at least one dimension is between one and 100 nanometres (1nm is 1,000,000 times smaller than a millimetre).

"The Holy Grail is to engineer the nanoparticles so they become highly active against infectious bacteria, but they do not kill human cells," he said.

"Traditionally, silver nanoparticles are more toxic than gold nanoparticles but our research has shown that silver can be made very safe for biomedical applications by controlling the surface chemistry of nanoparticles."

Associate Professor Bansal said the surface of the nanoparticle is critically important because it is what first comes into contact with bacteria or human cells.

This work was recently featured on the cover of the Royal Society of Chemistry journal *Nanoscale*.

Provided by RMIT University

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