Light activated infection- resistant biomaterial

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Technology description

Innovation

Researchers at QUB have invented a unique technology uses photosensitising molecules, of the same class used in photodynamic therapy for the treatment of various cancers. When exposed to visible light, these molecules generate reactive oxygen species, predominantly singlet oxygen, which is indiscriminately cytotoxic. The technology is aimed at killing bacteria which adhere to medical devices and biomaterials after implantation. The process is catalytic, so the sensitizer can give a prolonged protection, unlike conventional drug-incorporation strategies.

The sensitizers can be incorporated into a range of materials in a straightforward and inexpensive process and is based on clinically-approved compounds.

The principal areas for this technology are for devices where the surface can be readily addressed by light, such as ophthalmic biomaterials (intraocular and contact lenses), wound dressings, urinary and central venous catheters, and endotracheal tubes. The biomaterial could also be used in industrial applications such as plastic packaging and plastic consumables.

Background

In the hospital sector, hospital acquired infections (HAI) are a major concern, with HAI deaths running into several thousands a year in the UK alone. Evidence is emerging that organisms such as MRSA can survive on the fabric of a building. This is a significant discovery as ceilings and walls in medical environments tend to be cleaned less frequently than floors. A wide variety of businesses such as direct food handling, pharmaceutical manufacture, hospitals, leisure centres and the animal handling industry require a high level of cleanliness to ensure that micro-organisms do not multiply and contaminate products or effect human health. Surfaces must not only be easy to clean, and where necessary, to disinfect, but also prevent the build-up of dirt, shedding of particles and condensation.

Market Opportunity

In the US, the total revenue from the antimicrobial paints and coatings market (specifically for lowering infection or contamination) was $175.4 million in 2005 and is estimated to grow to $488.9 million in 2012, demonstrating a high growth opportunity. In the US paints and coatings market, the two market segments showing the largest increase in sales are the medical devices and the antimicrobial agent coatings markets which is the core target market for the QUB Photodynamic antimicrobial paints & varnishes technology.

Advantages

Low cost technology offers distinct advantages over competing drug-eluting and silver-based technologies.
Spectrum of activity is very broad, including activity against MRSA, and other problem organisms
There is no leaching of the sensitizer from the device surface Persistence of activity has been demonstrated beyond 3 weeks, with no reduction in efficacy
Developed methods to incorporate surface layers in several classes of polymer, including hydrogels, PVC and silicones.

Institution

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