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Regenerative medicine

Threat or opportunity?



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materials that belong
to the body

ComfortCoat™ Hemocompatible Antimicrobial Coatings

Where comfort meets infection prevention

Central venous catheters are associated with hundreds of thousands of intravascular catheter-related bloodstream infections every year. DSM ComfortCoat™ coating technology offers hemocompatible antimicrobial coatings that can help prevent these infections. These coatings are well suited for central venous and intravenous catheters, as well as all other catheters that come into contact with blood.

DSM coating solutions provide:

- Prolonged antimicrobial efficacy
- Excellent hemocompatibility
- Superior lubricity and durability
- Robust and high-throughput UV-cured process
- High quality and compliance standards

DSM Biomedical's innovative technology and ground-breaking materials enable medical device manufacturers to design and deliver products that lead to better device performance and most importantly, better patient outcomes.

When it comes to designing your next device, trust the global leader in biomaterials, DSM Biomedical.

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Unlimited. **DSM**

Innovation improves healthcare quality

As one of the top four leading causes of death in US hospitals, nosocomial infections must be regarded as a serious health hazard. Antimicrobial coatings can help prevent infection and aid in restoring a patient to full health.

DSM Biomedical is a global leader in biomedical materials, providing proprietary materials-based solutions that enable new and more effective treatments for the medical device and biopharmaceutical industries. With over 20 years of experience in materials science and life science combined with an extensive in-house library of synthesis methods, formulation and processing techniques, DSM has successfully supported its partners from initial market research and R&D, to pilot production and full-scale manufacturing.

Building on the expertise and strengths of DSM Biomedical and its 2008 acquisition of The Polymer Technology Group (now known as DSM PTG), the company has a comprehensive product portfolio, developing and marketing patented UV-cured coating technologies that can help improve the performance of medical devices over a wide range of applications and procedures. These coatings include innovative ComfortCoat hydrophilic coating, VitroStealth non-fouling coating, and two types of antimicrobial coatings (ComfortCoat silver-based antimicrobial and ComfortCoat non silver-based antimicrobial) that can help improve patient comfort and care.

Combating nosocomial infection

The US Centres for Disease Control and Prevention listed nosocomial infections as the fourth leading cause of death after heart disease, cancer and stroke. 80% of these infections are due to indwelling medical devices such as catheters and can cost the healthcare industry an average of \$1.2 billion a year. Preventive measures have therefore been taken, with the application of antimicrobial coatings to catheters shown to reduce catheter-associated urinary tract infections (CAUTI; urological catheters) by three times and bloodstream infections (BSI; central venous catheters) by 15 times (Frost and Sullivan, 2003).

DSM Biomedical studied the bacterial infection of catheters on two levels; the implant-anatomical level and the surface-biomaterial level. This resulted in the development of two new antimicrobial coating technologies – ComfortCoat silver-based antimicrobial and ComfortCoat non silver-based antimicrobial – that are based on the groundbreaking product, ComfortCoat, a hydrophilic lubricious coating that can help improve patient comfort and care. Similar to existing ComfortCoat hydrophilic coatings, these antimicrobial coatings are characterised by an excellent lubricity and superior durability that subject the mucosal tissue to minimal friction-induced damage. The adhesion of bacteria to catheter surfaces is also reduced by the

hydrogel nature of the coating, improving patient safety. Broad-spectrum antimicrobial agents were selected because CAUTI and BSI are caused by Gram-negative and Gram-positive bacteria as well as by yeasts.

Superior performance

Antimicrobial testing performed by DSM and experiments performed by independent test institutes demonstrate excellent antimicrobial activity for both coatings. Antimicrobial activity was tested under physiological conditions using a variety of bacteria, including clinical isolates and antibiotic-resistant strains, and yeasts such as *Candida albicans*. Tests were performed with bacterial challenges mimicking the onset of initial and more mature stages of infections. Test results showed that antimicrobial coatings are stable under physiological conditions and maintain their antimicrobial activity for up to 30 days. Superior performance was demonstrated in comparison studies with the major antimicrobial devices on the market. More recently an encrustation study (Gepi-Attee and Feneley, 1997) was performed at the Bristol Urological Institute for the silver-based coating, showing less encrustation.

At the University Hospital in Tuebingen, the Chandler-Loop model (Chandler, 1958) was used to study the haemocompatibility of the non silver-based antimicrobial coating. In contrast to major antimicrobial devices currently on the market, the developed coating showed no haemolysis and no thrombogenicity.

DSM Biomedical's antimicrobial coating solutions have been developed for Foley catheters, intermittent catheters and central venous catheters, and can be easily tuned to other applications as selected properties can be optimised by adapting chemistry and processing. The UV-curing coating process is suitable for various devices and most substrates including heat-sensitive polymers. ■

References

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