Anti-Microbial Face Masks

Protective filtering respirators for foul atmospheres

Researchers at Virginia Commonwealth University have developed a new anti-microbial face mask to reduce the incidences of hospital-acquired infections. Healthcare professionals who use face masks as vital pieces of personal protective equipment (PPE) will benefit greatly from the protective technology against airborne microbial contamination. Traditional N95 masks can only block the transport of these pathogens into the wearers respiratory system but cannot inactivate them on the mask surface, leading to possible cross-contamination. This mask minimizes infection risk by integrating quaternary ammonium compounds (QACs), a new low-cost alternative antibacterial agent, into the nanofibrous filter to kill microbes on surface and within the filter of the mask.

Benefits

- Low cost antimicrobial material
- Stable covalently bonded QAC crystals
- >95% particle filtering (N95)

Applications

- Surgical masks
- Protective face respirators
- HVAC filters
- Air purification

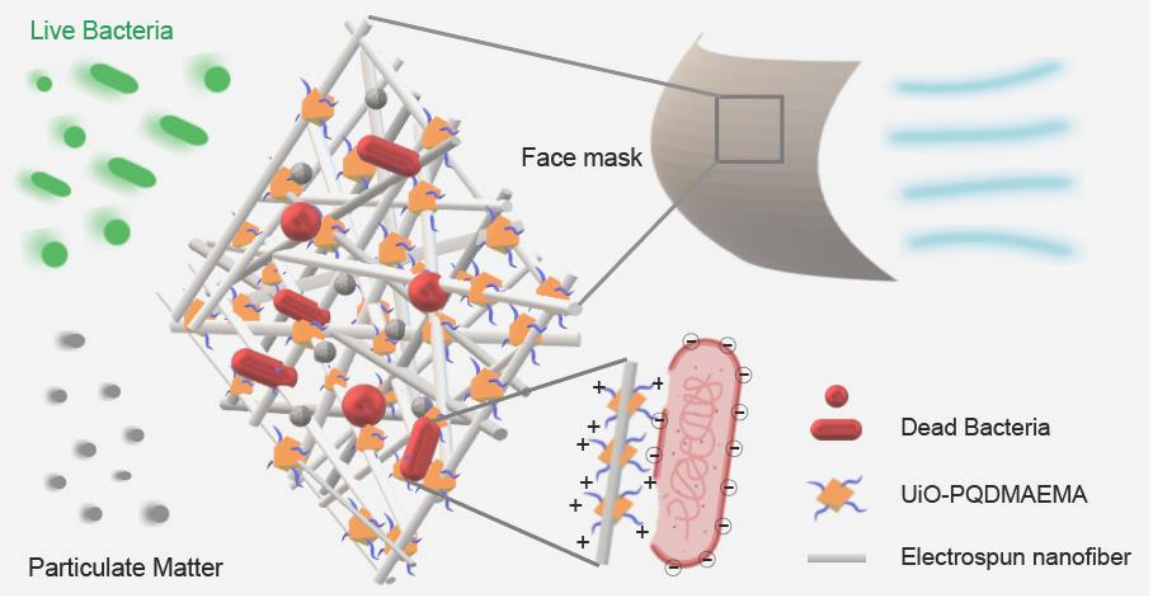

Figure 1. Schematic of new mask technology and method of bacterial inactivation.

The technology

This mask technology is designed to maintain high particle filtration (>95%) while also preventing bacterial accumulation on the mask. The filter material is comprised of a metal organic framework (UiO-66-NH2) that is covalently bond with PQDMAEMA, as the contact-killing QAC agent. This material has a filtration efficiency of 95.4% at the highest penetrating particle size of 80nm. Additional, *in vitro* antibacterial assays demonstrate effectiveness to inactivate both Gram-positive and Gram-negative bacteria after 2 hours of exposure.

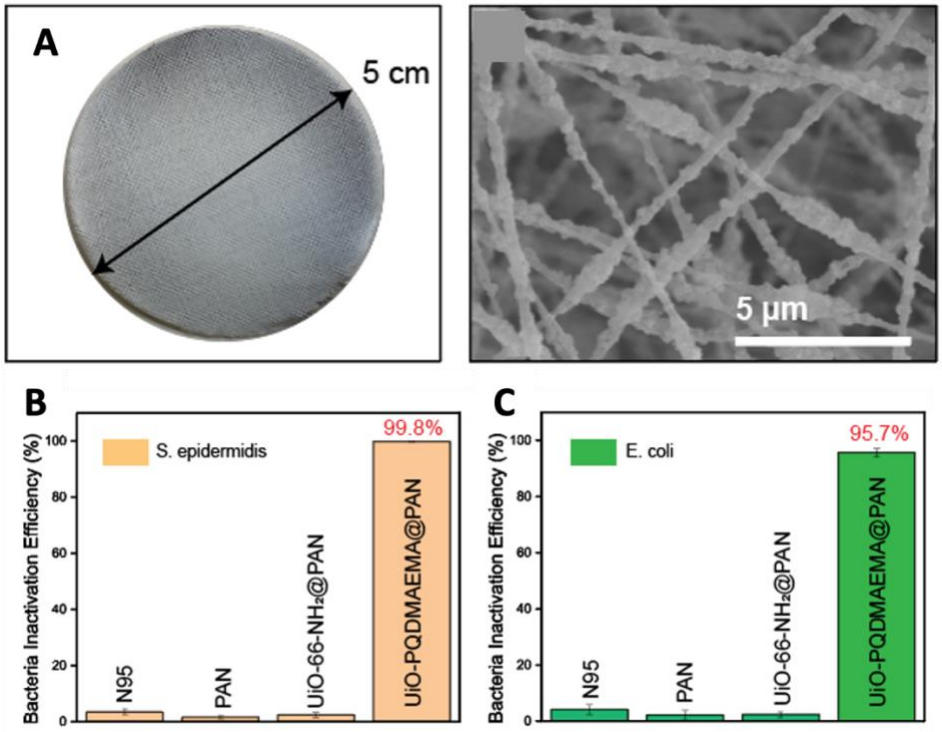

Figure 2. A) The digital image and SEM image of the QAC-modified MOF sample. B) Gram-positive anti-bacterial assay. C) Gram-negative anti-bacterial assay.

Additional information

Patent status:
Patent pending: U.S. and foreign rights are available.

License status:
This technology is available for licensing to industry for further development and commercialization.

Category:
Biomedical

VCU Tech #:
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