# #00366
# Antibacterial textile materials: treatments and performance evaluations

F. Advanced and sustainable coatings for high performance textiles

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**Abstract**

Antimicrobial finishing in textiles has grown dramatically over the last decades. The potential application field is wide. Antimicrobial finishes are used in many textile products, such as sportswear, outdoor apparel, undergarments, shoes, furnishings, upholstery, hospital linens, wound care wraps, towels and wipes. Other applications are envisaged for antibacterial filter applications (e.g., biotechnology processes, water purification, clean rooms, operating theatres, domestic appliances). Most of the microorganisms involved in textile contaminations can cause pathogenic effects. Many species, such as *Escherichia coli* and *Staphylococcus aureus* can cause infections in human beings due to user contamination. Therefore, the demand for antimicrobial textiles is gaining interest, showing a strong increase over the last few years. The present work reviews our research in antibacterial treatments on textile materials. Different approaches to producing antibacterial fabrics have been developed using natural biocides, ceramic nanoparticles (NPs) and polymer biocides to reduce the leaching of biocidal agents into the environment: in-situ polymerization on textiles of a positively charged conjugated polymer (polypyrrole); production of PPy NPs for the spray-coating of textiles with antimicrobial properties; modification of cotton and polyamide 6,6 fabrics with different acid (citric, maleic and tannic) bind to fiber surface; coating of cotton and polyamide 6,6 fabrics with chitosan (a natural biopolymer) in order to exploit the property of chitosan to cross-link natural dyes and make them antibacterial even after dyeing; deposition of chitosan followed by UV-curing on gauze for water filtration; production of highly concentrated suspensions of silver nanoparticles (Ag NPs) with eco-friendly process and deposition on textiles with antiviral and antibacterial properties suitable for facemasks, in response to the battle against SARS-CoV-2; production of photocatalytic filters based on titania NPs deposited on textile or polymeric substrate, for air purification treatment. All treated materials showed excellent antibacterial properties against Gram-negative and Gram-positive bacteria when tested following standard test methods (AATCC 100, ASTM E 2149-13).

*Acknowledgments.* This study was carried out

within the MICS (Made in Italy – Circular and Sustainable) Extended Partnership and received funding from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.3 – D.D. 1551.11-10-2022, PE00000004). This manuscript reflects only the authors' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.".