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Inkjet Printing of Silver Nanoparticle-bound Biomaterials on Cotton Fabric to Prevent Antimicrobial Resistance

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Extended Abstract

The emergence of multi-resistant bacteria, untreatable with conventional medicines, is a significant global health concern.[1] This study proposes a unique solution to this problem by digitally inkjet printing biomaterials bound with silver nanoparticles (NP) on cotton textiles. The silver nanoparticles, known for their effective antimicrobial properties [2], are stabilized, and made biocompatible by the enzymes. The use of digital inkjet printing allows for precise application of these NP-biomaterial conjugates, ensuring uniform coverage and optimal performance. This approach aims to prevent the spread of antimicrobial-resistant bacteria through cotton textiles in medical care environments, thereby enhancing patient safety.[3] The inkjet printing technology used in this study offers high-resolution patterning, enabling the creation of complex designs with multiple materials. This flexibility allows for the development of textiles with varying antimicrobial properties, tailored to specific applications in the medical field. Furthermore, the use of cotton, a natural and breathable material, ensures the comfort and safety of patients, making it an ideal choice for this application. Initial results show that above-mentioned NP printed fabric can ensure more than 99% reduction (2 logs) of a gram-positive bacteria strain.

Keywords: Digital inkjet printing, Biomaterials, Nanoparticles, Enzymes, Antimicrobial-resistant bacteria, Cotton textile

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