

## Development of Bioactive Medical Textiles by Immobilizing Nanoparticles at Cotton Fabric

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**Abstract :** Personal protective equipment (PPE) and bioactive textiles are highly important for the health care of front line hospital workers, patients, and the general population to be safe from highly infectious diseases. This was even more critical in the wake of COVID-19 outbreak. Most of the medical textiles are inactive against various viruses and bacteria, hence there is a need to wash them frequently to avoid the spread of microorganisms. According to survey conducted by the world health organization, more than 500 million people get infected from hospitals, and more than 13 million died due to these hospitals' acquired deadly diseases. The market available PPE are though effective against the penetration of pathogens and to kill bacteria but, they are not breathable and active against different viruses. Therefore, there was a great need to develop textiles that are not only effective against bacteria, fungi, and viruses but also are comfortable to the medical personnel and patients. In the present study, waterproof breathable, and biologically active textiles were developed using antiviral and antibacterial nanomaterials. These nanomaterials like  $\text{TiO}_2$ , ZnO, Cu, and Ag were immobilized at the surface of cotton fabric by using different silane coupling agents and electroless deposition that they retained their functionality even after 30 industrial laundering cycles. Afterwards, the treated fabrics were coated with a waterproof breathable film to prevent the permeation of liquid droplets, any particle or microorganisms greater than 80 nm. The developed cotton fabric was highly active against bacteria and viruses. The good durability of nanomaterials at the cotton surface after several industrial washing cycles makes this fabric an ideal candidate for bioactive textiles used in the medical field.

**Keywords :** antibacterial, antiviral, cotton, durable

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