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MULTIFUNCTIONAL COTTON FABRIC VIA SURFACE-INITIATED PHOTOATRP

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Graft polymerization of cotton fabrics has numerous potential applications in textile industry such as reduction of hydrophilicity, imparting flame retardancy and antibacterial activity. Recently surface-initiated reversible deactivation radical polymerizations such SI-ATRP have been successfully employed for cellulose modifications. Focusing on PhotoATRP, a polymerization technique which presents several advantages with respect to other ATRP processes. These include the possibility of temporal control over polymer chain growth, enhanced tolerance toward oxygen, and the reduction in the amount of catalyst necessary to attain a controlled polymerization.

SI-PhotoATRP for cotton fabric modification is yet to investigate. Here, we report preparation of a multifunctional cotton fabric using SI-PhotoATRP. The study includes also two new investigations about photoATRP of (2-dimethylamino) ethyl methacrylate (DMAEMA) and dimethyl(methacryloyloxymethyl) Phosphonate (MACP1) monomers. Conditions such as effect of solvent, effect of ligand and its concentration, effect of light intensity, effect of catalyst type and its concentration and effect of initiator efficiency were optimized. $CuBr_2$/TPMA in 200 ppm amount was found to give better control with EBIB initiator with monomer concentration of 40 % volume percentage. The grafting of both monomers onto the fabric surface was conducted to impart antibacterial and anti-flammability characteristics to the fabric. The fabric was characterized by FTIR, TGA, XPS and SEM. Antibacterial and flammability of the obtained cotton fabric was measured. Durabiliy of the modification and the mechanical properties of the modified fabric was also measured.

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