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Polyfunctional cotton fabrics with catalytic activity and antibacterial capacity.

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Abstract:

A novel, eco-friendly and cost-effective method involving cotton fabric (CF) coating with copper oxide and grafting of 3-chloropropyltriethoxysilane and diethanolamine resulted in a multifunctional material (CF@CuO-Si-N(OH)₂). The latter exhibited catalytic activity in 4-nitrophenol (4-NP) reduction, methylene blue degradation and antibacterial activity. Scanning electron microscopy, energy dispersive X-Ray-fluorescence, Fourier transform infrared and UV-visible spectroscopies, contact angle and thermogravimetric analysis revealed the key-role of amine grafting in changes in wettability, stability, morphological and thermal properties. 4-NP catalytic reduction was found to obey 1st-order kinetics, affording 98 % conversion even after 7 successive reuses. CF@CuO-Si-N(OH)₂ also exhibited appreciable antibacterial capacity against *Staphylococcus epidermidis* (*S.epidermidis*) and *Escherichia coli* (*E .Coli*). These results open promising prospects for using textile fiber-based nanocomposites in diverse technological applications.

Keywords: Cotton fabric; Copper oxide; Diethanolamine; 4-nitrophenol reduction; dye degradation; antibacterial capacity.

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