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Abstract

The deposition of conductive metal layers on non-conductive material represents a key technology in the development of textile fiber based smart materials. We describe the results of a study on the electroless copper deposition on a woven cellulose fabric via surface activation through silver seeding. A bath composition containing HCHO and $C_4H_5KO_6$ in the molar ratio 1:0.08, a cellulose fabric and copper sulphate pentahydrate, at a pH of 12.5 was found to be optimum for reducing induction times of the deposition. Potentiometric measurements of the treatment solution during deposition allowed for an optimization of the bath compositions. The treated fabrics were analyzed with confocal laser scanning microscopy, photomicrograph scanning electron microscopy and energy dispersive X-ray to assess the topology, and with electrical measurements to determine the conductivity. The electrical sheet resistances ranged from 16.5 - 369.3 Ω sq^{-1}, which indicated that the deposition levels were not homogenous across the substrate. A continuous conductive copper layer was successfully deposited. As a test of the layer continuity, a Light emitting diode was successfully illuminated through the substrate.

Keywords:

Electrical Resistance; Redox potential; Tartrate ligand; Textile; Metallization