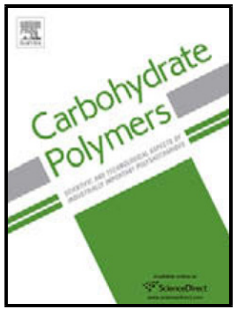

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Greensilica®vectors for Smart Textiles

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Highlights

- SiO_2, amineSiO_2, diamineSiO_2 and epoxySiO_2 particles were ecofriendly synthesized;
- cotton and polyester textiles were impregnated with silica-based particles;
- *cure* and *no cure* impregnation were tested;
- fabrics impregnation was confirmed by SEM and quantified by ICP;
- diamine-SiO_2 particles exhibited the best performance in *cured* textile matrices;
- diamine-SiO_2 particles still exhibited the best performance in *non-cured* cotton textile;
- while amine-SiO_2 present the best achievement in *no cure* polyester matrix;

Abstract

The present work aims developing a *versatile Greensilica*® vector/carrier, able to bind to a wide range of textile matrices of carbohydrate polymers and susceptible of being loaded with chemicals/drugs/therapeutic molecules, to create a *green* tailor-made (multi)functional *high-tech* textile. A green, eco-friendly, ammonia-free, easily scalable, time-saving sol-gel process was established for the production of those silica-based colloidal particles (SiO_2, amine-SiO_2, diamine-SiO_2, and epoxy-SiO_2). Two different textile matrices (cotton, polyester) were functionalized, through the impregnation of *Greensilica*® particles. The impregnation was performed *with* and *without cure*. Diamine-SiO_2 colloidal particles exhibited the higher bonding efficiency in *cured* textile matrices (both cotton and polyester), while with *no cure* the best adherence to cotton and polyester textile matrices was achieved with diamine-SiO_2 and amine-SiO_2, respectively. *Use once and throw away* and *continued use* applications were envisaged and screened through washing tests. The efficiency of the textiles impregnation was confirmed by SEM, and quantified by ICP.