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## Modification of cotton fibers with magnetite and magnetic core-shell mesoporous silica nanoparticles

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Composite materials with natural cellulosic fibers had attracted a lot of attention due to their biodegradability, excellent mechanical properties, and high surface reactivity. Cotton is one of the most abundant cellulosic fibers and it is widely used in industry and research due to its flexibility, water absorption, air permeability, and low cost. Electrostatic layer-by-layer (LbL) assembly is used as a common technique for cotton modification through the formation of controllable nanolayers on the surface by the adsorption of oppositely charged polyelectrolytes. LbL technique is attractive due to its simplicity and easy incorporation, besides, the solutions employed during this technique can be reused in which water is the main solvent. Methods like dip-coating and padding allow the electrostatic interaction between the negative charges of nanoparticles and the polyelectrolytes of the cotton surface. Core-shell nanoparticles have been the focus of many investigations due to the synergistic effect of using a combination of two different materials in one approach. Their unique functionalities depend on the interaction between the core and the shell allowing to expand the fields of applications according to the physicochemical properties offered by the materials. In this study, cotton fibers surfaces were modified using PDDA and PSS polyelectrolytes to generate an electrostatic interaction with the magnetite and magnetic core-shell mesoporous silica nanoparticles. The as-synthesized nanomaterials were characterized with different techniques such as TEM, SEM, XRD, and VSM, in order to analyze the resulting novel, innovative and promising nanocomposite for different applications such as a magnetic response nanomaterial and drug delivery.

### Biography

David Patino Ruiz is a chemical engineer and doctoral candidate in engineering with emphasis in Science and Technology of Materials at Universidad de Cartagena. The research has been focused on synthesis, characterization, and application of nanomaterials for different fields in which include water and soil treatments, drug load and delivery, among others. He has made oral presentations in different conferences with nanotechnology approaches and has made research exchanges at Cornell University with the collaboration of doctoral students in order to increase his knowledge in nanomaterials with highly desired characteristics for different purposes.

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