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Preparation of catalyst-loaded viscose rayon fibers with sustainable antimicrobial functionality

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Viscose rayon cellulose fiber was first selectively oxidized on its surface without significant loss of its pristine fiber structure so that carboxylate functional group was introduced on the fiber. Separately, uniformly dispersed silver nanoparticles (AgNPs) having sizes of 2-5 nm were prepared by using amine-terminated fourth generation poly (amido amine) dendrimer as a capping agent. Then, the AgNPs were immobilized on viscose rayon fibers through chemical reaction to form amide bond between terminal amine groups of dendrimer protector with the carboxylic acids on oxidized fibers. The loaded nanoparticles did not release away from the fiber even after 60 times washings. The AgNPs-loaded fibers (0.3 wt. %) has exhibited excellent biocidal activity against *E. coli*. Therefore, this procedure can be effective for theprolonged sustainment of similar bioactive agents on fibers and maximize the efficiency of the cellulose product for anticipated purposes.

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Development of high strength & watertight nano blended concrete using optimized curing media

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Nano-engineering of concrete is a relatively new but rapidly growing area in concrete research. This study deals with development of high strength and watertight cement based concrete incorporating agro-waste rice husk ash (RHA) and silica nanoparticles as supplementary cementing materials replacing cement particles. Various ternary blended concrete mixtures were produced using RHA and silica nanoparticles with average size of 5 μm and 15 nm, respectively. Fresh and hardened concretes incorporating 5, 10, 15 and 20% of RHA and 0.5, 1, 1.5, and 2% of silica nanoparticles with constant water to binder ratio and aggregate content were prepared and tested. Fresh mixtures were tested for workability and hardened concretes were tested for compressive strength and water absorption at 7, 28 and 90 days of curing in lime solution. The overall results confirmed that the newly developed composition highly contributes to the mechanical and physical properties of concert due to the effects of silica nanoparticles.

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