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Glass-ceramics fabricated with coal gangue as main raw material

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High strength glass-ceramics were fabricated with coal gangue and clay as main raw materials. The effects of the ratio of the coal gangue with clay, mineralization agents, forming process and sintering process on the properties of the glass-ceramics were studied. The ratio of coal gungue and clay for optimum property are 3/1. The glass-ceramics showed a main phase of mullite and spindle. The appropriate amounts of codoping of TiO_2, ZnO, and MnO_2/dolomite as mineralization agents obviously improved the properties of the glass-ceramics, leading to optimal strength of ~187.67 MPa, water absorption of ~0 % and density of 1.83 g/cm^3. Process optimizations further determined reasonable and optimal process parameters of forming and sintering.

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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 the prolonged sustainment of similar bioactive agents on fibers and maximize the efficiency of the cellulose product for anticipated purposes.

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