Two types of sorption-active polypropylene fiber carrying strong-acid sulfonate groups and amino groups have been synthesized by radiation-induced graft polymerization of GMA, with subsequent chemical modification of the epoxy groups of poly-GMA graft chains. The effect of various polymerization parameters on the GMA grafting degree was investigated in detail. The epoxy ring-opening of poly-GMA graft chains with introduction of strong-acid sulfonate groups was carried out with sodium hydrogensulfite in water-dimethylformamide solution at 70°C. The main peculiarities of the sulfonation reaction in depending on the reaction time and GMA grafting degree have been investigated. Amine groups were incorporated by treatment of the GMA-grafted polypropylene fibers with excess of diethylene triamine reagent. The conversion of the epoxy groups into the functional groups was investigated as a function of the degree of GMA grafting and reaction time. The ion-exchange characteristics of obtained sorption-active polypropylene fibers have been determined.

Keywords: Nonwoven polypropylene fibers, synthesis, electron beam irradiation, functionalization of polymers, graft copolymerization.

SUSTAINABILITY OF SILVER NANOPARTICLES IN SOLUTIONS AND POLYMER MATERIALS

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The technology of obtaining stable silver nanoparticles in solutions and composite materials for attainment of antimicrobial and antifungal properties to different surfaces has been developed. The shape of particles is spherical, diameter is about 5 nm.

Various concentartions of silver nanoparticles have been deposited onto surfaces of different materials (cotton and synthetic fabrics, fibroid sorbents and polymer materials). Different ways of treatment and densities of nanoparticles on the treated surface have been studied during 6 months with respect to the best sustainability. In order to prevent agglomeration of obtained metal nanoparticles on the surface of materials treated, stabilizing reagents (ethylene glycol, formic acid, sodium dodecyl sulphate, etc.) have been used and their relative efficacy has been examined. Residual concentrations of the nanoparticles on various fabrics after 1, 3, 5 and 10 cycles of washing have been also studied. The treated fabrics keep their antibacterial properties after at least 3 times of laundering. The best finishing process to attach silver nanoparticles combination to various materials has been compared with biocidal properties of such antibacterial agents as metal salt solutions and zinc pyrithione.The possibility of treatment of nuclear track membranes by silver nanoparticles in order to prevent microbial growth on the surface of membranes has been discussed.