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Potential of nanoparticles for water purification: a case-study on anti-biofouling behaviour of metal based polymeric nanocomposite membrane

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ABSTRACT

Nanotechnology is a potential augmentation to the existing water purification technologies. Four different types of functional nanomaterials, like carbon nanotubes, metal/metal oxide nanoparticles, dendrimers and zeolites, are currently under evaluation for water purification application. Nanomaterials offer excellent opportunities because of high surface area (surface/volume ratio), but the challenge is to build up an integrated scalable system. Membranes, because of being energy-economic and having the ability to get associated to different processes as a pretreatment or post-treatment stage, find tremendous applications in the field of water purification. Nanostructured materials serve as a wonderful tool towards development of high flux, high selective membranes. Here attempts are made to develop biofouling resistant membrane. Nanoparticles of silver, copper and silver–copper mixture were impregnated on to the polysulfone host matrix and the biofouling resistance behavior of each membrane surface was examined. The performance of the membranes was evaluated in terms of pure water permeability and solute rejection studies. The membranes were characterized using scanning electron microscopy, energy dispersive X-ray, water contact angle and atomic force microscopy studies. The authors conclude that the silver impregnated membranes possess the best biofouling resistant behavior. The present paper discusses the potential of nanoparticles for water purification and explains briefly the R&D work carried out in the research centre towards development of a biofouling resistant nanocomposite membrane.

Keywords: Nanoparticles; Water purification; Nanocomposite membrane; Biofouling

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