The adaptation of nanotechnology into water treatment systems

Phillemon Matabola, Richard Moutloali, Keneiloe Sikhwivhilu, Mokae Bambo

DST/Mintek Nanotechnology Innovation Centre, Advanced Materials Division, Mintek, Private Bag X 3015, Randburg, 2125

Email: PhilemonM@mintek.co.za

Today, poor access to clean freshwater and sanitation remain the biggest problems faced by mankind throughout the world [1]. The problem is further compounded by the worldwide industrialization and population growth [2]. According to World Health Organization (WHO), 1.2 billion people can hardly obtain safe drinking water and every year millions of people die from diseases transmitted through unhealthy water [3].

As part of the worldwide attempt to alleviate the aforementioned challenges, the Water Nanotechnology Unit (WNU) at Mintek adopted several nano-based and chemical approaches in alleviating the water scarcity issues through finding ways of treating polluted and unsafe water. In the first approach, electrospun nanofibers are being fabricated through the electrospinning technique for potential applications as water filters for the degradation of organics and removal of pathogens. To further enhance their properties and performance, nanoparticles such as Cu, salts, etc. are added. The results indicated improved morphological changes and reduced fiber diameters upon the addition of the nanoparticles [4]. Secondly, catalytic nanoparticles are anchored onto the polymer surfaces to achieve two objectives: first is to degrade or transform toxic molecules into benign substance with low or no known toxicity and secondly to continually self-clean the surface by degrading adsorbed molecules during operations. The last approach involves the grafting of the hydrophilic monomers onto the polymer powders and fabrication of grafted powder into membranes to increase the hydrophilicity of the membrane contact areas which is known to reduce the adsorption of molecules onto the surface. The results showed increased hydrophilicity which led to improved flux and ability in removing the turbidity and colour from the river water.

References

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