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Fabrication of buckypapers using single-walled carbon nanotubes and investigation of its ability in water purification

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Abstract

In this study, buckypapers were prepared using a suspension of single-walled carbon nanotubes in methanol and deposited on a PTFE filter by vacuum filtration and then separated. The average pore size of the buckypapers produced by 30 and 50 mg of single-walled carbon nanotubes was 80 and 41 nm, respectively. The thermal conductivity of the produced buckypaper was 319.044 W/m.K, which is very close to the reported values. The electrical resistance of the samples increased with decreasing temperature, indicating a semiconductive behavior. To investigate the refining ability of the produced buckypapers, 100 ml of purified household water was passed through them by vacuum filtration and the water characteristics were measured before and after passing through the filters. The results showed that by increasing the thickness of the buckypapers, the hardness and conductivity of water decreased. So, for urban water samples, electrical conductivity and hardness decreased from 1709 $\mu\text{S}/\text{cm}$ and 1706 mg/L, after passing through the 70 mg filter to 1592 $\mu\text{S}/\text{cm}$ and 1582 mg/L, respectively. The experiments showed that the 50 and 70 mg buckypapers had a better performance than the PTFE filters.

Keywords: buckypaper, vacuum filtration, carbon nanotube, water refinement

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