The role of nanotechnology, based on carbon nanotubes in water and wastewater treatment

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ABSTRACT

One of the biggest challenges of the 21st century is the shortage of potable water coupled with increasing water pollution, industrialization and, an ever increasing population. Water is needed to sustain all socio-economic activities which render it vital for life support on earth. Owing to these circumstances, it has become imperatively significant to develop an active method to monitor and control these pollutants in the aquatic environment. Recently, different materials made of carbon nanomaterial have been widely used to construct different types of electrical electrodes to make biosensors and electrochemical sensors. Some of the materials made from carbon nanomaterial s include but not limited to; carbon nanotubes, grapheme, carbon nanohorns, and carbon black. Carbon nanotubes (CNTs) have contributed to the production of active electrochemical sensors/filters as an effective alternative technique in the field of water pollution control. CNT biofilters are generally known to absorb organic and chemical pollutants as a result of their intrinsic characteristics of high flexibility, effective stability, and wide surface area. They also exhibit the quality of electro-oxidation of the adsorbed pollutants which has been attested as potential water and wastewater treatment technology in different laboratory experiments. Active electrochemical CNT has also aided in the stability, sensitivity, and selectivity of filters/sensors. In the field of nanotechnology, CNTs have been discovered to display great water and wastewater treatment potentials due to their superb physiochemical characteristics. The modern technologies that have focused on the utilization of CNTs in the area of water and wastewater treatment technology predominantly used the carbon-based material as membranes or filters, adsorbents, electrodes and catalyst to degrade pollutants in water or wastewater. This study intends to explore and make a general overview of the role of nanotechnology, based on CNTs in water and wastewater treatment.

Keywords: Carbon nanotube filters; Adsorbents; Photocatalysis; Wastewater treatment; Membrane; Electrodes

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