Photodegradation of Ciprofloxacin Using Titanium Oxide Nanowires and Nanoparticles (P25)

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Ciprofloxacin is a fluoroquinolone antibiotic. Common water treatments are not able to degrade it properly, causing a bioaccumulation in nature, animals and humans. Being a genotoxic contaminant, it eventually leads to diseases such as peripheral neuropathy and cancer (Kummerer, 2000). Furthermore, Ciprofloxacin inhibits crucial environmental processes like carbon and nitrogen cycles mediated by microorganisms (Ollivier, 2010). Therefore, it's urgent to develop treatments capable of degrading this and other pollutants that are not degraded by conventional methods. Past studies have shown that the use of TiO2 in photodegradation processes is highly efficient (Kamat, 2002). Nonetheless, multiple morphology variations have been used in different investigations. The objective of this research is to prove if the use of Titanium Oxide nanowires could increase the degradation percentage of Ciprofloxacin. It was thought that the photodegradation of Ciprofloxacin was going to be more efficient with the use of TiO2 nanowires. For the procedure, TiO2 nanowires and TiO2 nanoparticles were added separately to two Ciprofloxacin solutions, which were exposed to UV light. Later, samples were taken every 20 minutes to analyze the absorbance of UV light using UV-1800. The results showed that TiO2 nanowires degraded Ciprofloxacin by 62.5% in 120 minutes. On the other hand, the contaminant degraded 68.3% in the same amount of time when TiO2 NPs were used. This proves that TiO2 NPs serve as a more efficient photocatalyst in comparison to TiO2 nanowires in terms of Ciprofloxacin degradation.