

UNIVERSITI TEKNOLOGI MARA

**SYNTHESIS OF CARBON DOPED
TITANIUM DIOXIDE (TiO₂)
PARTICLES VIA ELECTROSPRAYING
TECHNIQUE**

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ABSTRACT

Titanium dioxide (TiO_2) was one of the potential semiconductor material that used as potent adsorbents, catalysts for degradation of pollutants and also removals of organic and inorganic materials. The successful exploitation of TiO_2 required development of methods to improve the physical and chemical properties. This study focuses on production of fine size carbon doped TiO_2 particles under three objectives, produced small size C-doped TiO_2 particles using electrospray technique, characterized the chemical and physical properties of produced particles and evaluate the performance of produced particles in degradation of phenol under visible light. Hydrolysis of titanium isopropoxide, doping with carbon element and electrospray technique was used to produce C-doped TiO_2 . The characterization and analysis performed in this study revealed that smallest C-doped TiO_2 droplets produced from electrospray technique was 147 nm with narrow size distribution. Mechanism of droplet fission during electrospraying leads to formation of small and narrow distribution of droplets size produced. Doping the TiO_2 with carbon element improved its chemical properties by successfully lowering the band gap energy down to 2.46 eV and shifting its optical response toward visible light active. The presence of O-H bond in C-doped TiO_2 contributed to the efficiency of phenol degradation. The efficiency of phenol degradation under visible light irradiation increased by using C-doped TiO_2 as photo-catalyst for degradation process. The improved chemical and physical properties of the produced C-doped TiO_2 were able to overcome the drawbacks of TiO_2 and used effectively in degradation of pollutant.

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