

Synthesis of spherical and sheet-like RuO<sub>2</sub> nanomaterials under dielectric barrier discharge plasma and their photocatalytic properties

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This work reports the potential of dielectric barrier discharge (DBD) plasma reactor for synthesizing Ruthenium dioxide (RuO<sub>2</sub>) nanomaterials with different morphologies. The RuO<sub>2</sub> nanomaterials were prepared on four kinds of substrates which includes copper, silicon, glass and polyethylene terephthalate. The oxidation and inert atmosphere inside the reactor was created by changing the feed gas such as Ar or Ar+O<sub>2</sub> mixture, respectively. The morphology of the RuO<sub>2</sub> nanomaterials obtained from the exposure to the DBD plasma was found to depend strongly on the characteristics of the substrate as well as on the composition of the feed gas. The prepared nanomaterials were characterized by using X-ray diffraction spectroscopy, field emission scanning electron microscopy, energy dispersive X-ray spectroscopy and X-ray photoelectron spectroscopy. Spherical and sheet shaped nanomaterials prepared using the above technique was analyzed for their shape dependent photocatalytic behavior in the presence of a visible light.