# Synthesis of Visible-Light Responsive Hollow CuO-Rutile $TiO_2$ Photocatalysts and Application to Photocatalytic Degradation of Organic Compounds

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As Indiscriminate usage of fossil fuels in industrial fields has brought out severe environmental issues, demand for eco-friendly technologies has been increased to overcome. Especially, photocatalysis can be one of the key strategies to solve both objectives by utilizing solar energy. Titanium dioxide ($TiO_2$), a promising photo-catalysts, has many advantages such as non-toxicity, high stability and the economical. However, anatase $TiO_2$, which is a representative crystalline phase, has a drawback due to its wide bandgap (3.2 eV). That causes relatively low activity under solar light irradiation. To make up with this, the rutile phase which has a narrower bandgap energy (3.0 eV) can be a candidate. In this study, the rutile phase hollow $TiO_2$ was synthesized by the sol-gel and ion-exchange method. Photodegradation experiments of phenol under visible light irradiation were conducted, and the results indicated the superior activity of the as-prepared catalysts than anatase counterpart.