

## Visible light induced photocatalytic activity of Nb<sub>2</sub>O<sub>5</sub>/carbon cluster/Cr<sub>2</sub>O<sub>3</sub> composite materials

### ABSTRACT

Nano-sized Nb<sub>2</sub>O<sub>5</sub>/carbon cluster/Cr<sub>2</sub>O<sub>3</sub> composite material was prepared by the calcination of NbCl<sub>5</sub>/chromium acetylacetonate/epoxy resin complex under an argon atmosphere. The Pt-loaded Nb<sub>2</sub>O<sub>5</sub>/carbon cluster/Cr<sub>2</sub>O<sub>3</sub> composite material shows the photocatalytic activity under visible light irradiation. The composite material successfully decomposed the water into H<sub>2</sub> and O<sub>2</sub> in the [H<sub>2</sub>]/[O<sub>2</sub>] ratio of 2. Electron spin resonance spectral examination suggests a two-step electron transfer in the process of Nb<sub>2</sub>O<sub>5</sub> → carbon cluster → Cr<sub>2</sub>O<sub>3</sub> → Pt.

**Keyword:** Nanostructure; Carbon cluster; Semiconductor; Chemical synthesis; Electronic structure