Rare earth elements/WO$_3$ nanowires: Visible lights nanophotocatalysts

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**ABSTRACT**

Tungsten trioxide nanowires were prepared successfully by a sol-gel technique. Rare earth doped tungsten trioxide nanowires were successfully prepared by a photoassisted deposition route. Tungsten trioxide and rare earth doped tungsten trioxide nanowires were characterized by many characterization methods. The XRD results reveal that all tungsten trioxide and rare earth doped tungsten trioxide nanowires samples are composed of WO$_3$ form. Also, we noticed that the intensity of tungsten trioxide sample is higher than that of rare earth doped tungsten trioxide nanowires samples, which means rare earth elements can retard grain growth of WO$_3$ particles. Nd-WO$_3$ photocatalyst has the lowest crystallite size and band gap and has highest photocatalytic activity and specific surface area in regard to other rare earth doped WO$_3$ samples. This can be attributed to its individual properties of crystallite size, band gap and surface of texture. Details of the preparation process and outcomes of characterizations of the prepared rare earth doped tungsten trioxide nanowires are discussed.

**Keywords:** Tungsten trioxide; Rare earth; Thiophene