# Design of $Gd_2O_3$ nanorods: a challenging photocatalyst for the degradation of neurotoxicity chloramphenicol drug

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## Abstract

In the present study, a gadolinium oxide ($Gd_2O_3$) nanorod was successfully synthesized by simple hydrothermal method for the photocatalytic degradation of chloramphenicol (CAP) drug under UV light illumination. Interestingly, the rod like morphology was observed from the TEM images with the particle size of 20 nm. The XRD results suggested that the high crystalline nature of the $Gd_2O_3$ nanorods with the crystalline size of 13 nm. The XPS results confirmed the formation of $Gd_2O_3$ nanorods and the oxidation states of different elements were addressed. The photocatalytic degradation of CAP was performed under ultra violet light illumination on $Gd_2O_3$ nanorods surfaces. The $Gd_2O_3$ nanorods were showed enhanced efficacy compared to the standard $TiO_2$ under UV light illumination. The photocatalytic degradation results revealed that the drug was degraded within a short span of time. 50 mg of $Gd_2O_3$ nanorods and 20 mg/mL of drug concentration were the optimized condition for the effective photocatalytic degradation. The reactive oxidative species actively involved in the photodegradation of CAP was ·OH and up to 5th recycle the $Gd_2O_3$ nanorods were possessed excellent stability.