Supporting information:

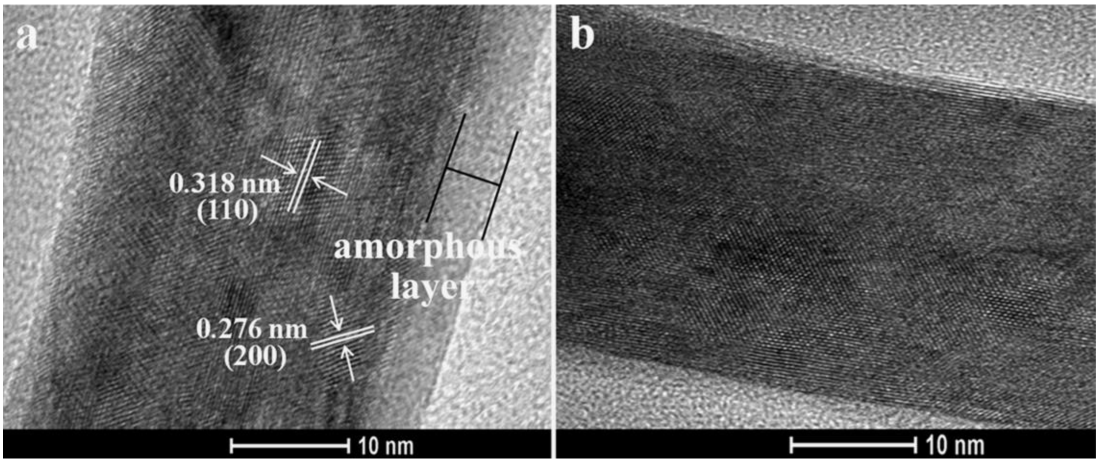

Fig.S1. HRTEM images of the $Sm(OH)_3$ nanocrystallites prepared by

(a) precipitation and (b) the hydrothermal method

Fig.S1a shows the TEM image with a higher resolution of an individual $Sm(OH)_3$ nanorod prepared by the precipitation method. Fig.S1b shows the high–resolution TEM image of an individual well-crystallized $Sm(OH)_3$ nanorod prepared by the hydrothermal method. The amorphous layer only exists in Fig.1Sb, which confirmed that the low temperature precipitation synthesis introduced an amorphous layer on the $Sm(OH)_3$ nanorods.

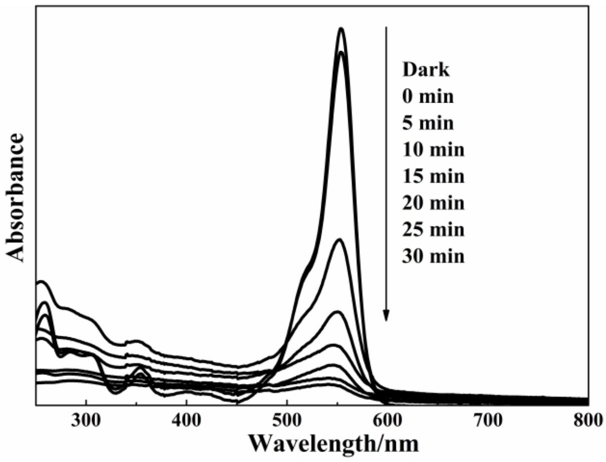

Fig.S2. UV-vis absorption spectral changes of RhB (5 mg·L^{-1}) from $Sm(OH)_3$ nanorods prepared by the precipitation method

The photocatalytic activity of the as–prepared $Sm(OH)_3$ nanorods were evaluated by the degradation of 5 mg·L^{-1} RhB aqueous solution under 500 W mercury lamp irradiation. The detailed results of the absorption spectra during the photocatalytic degradation process are shown in Fig.S2. As the irradiation time is prolonged, the RhB absorption peak decreases quickly.

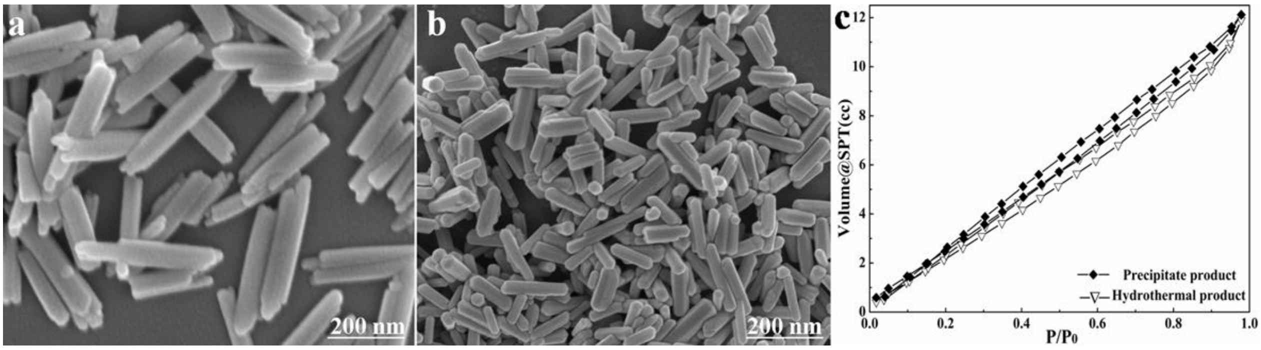

Fig.S3. SEM images of $Sm(OH)_3$ nanocrystallites prepared by (a) precipitation and (b) the hydrothermal method. (c)Nitrogen adsorption–desorption isotherms of $Sm(OH)_3$ nanorods prepared by different methods

Figs S3.a and b show the SEM images of the $Sm(OH)_3$ nanocrystallites prepared by precipitation and the hydrothermal method, respectively. Fig.S3.c shows the Nitrogen adsorption–desorption isotherm of $Sm(OH)_3$ nanorods prepared by different methods. The specific surface areas of the samples were measured by the nitrogen adsorption method using an American Quantachrome NOVA–2200E instrument. Based on the BET specific surface area analysis method, the specific surface area of the sample prepared by precipitation and by the hydrothermal method was calculated as 61.24 and 58.58 m^2/g, respectively.