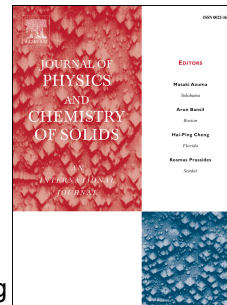


Accepted Manuscript

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PII: S0022-3697(18)31560-9

DOI: [10.1016/j.jpcs.2018.09.010](https://doi.org/10.1016/j.jpcs.2018.09.010)

Reference: PCS 8723

To appear in: *Journal of Physics and Chemistry of Solids*

Received Date: 9 June 2018

Revised Date: 20 August 2018

Accepted Date: 6 September 2018

Please cite this article as: M. Chang, H. Zou, Y. Song, J. Chen, L. Cui, Y. Sheng, K. Zheng, Photoluminescence and photodegradation properties of $\text{SiO}_2@\text{TiO}_2:\text{Sm}^{3+}$ with different coating effects, *Journal of Physics and Chemistry of Solids* (2018), doi: 10.1016/j.jpcs.2018.09.010.

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Photoluminescence and photodegradation properties of $\text{SiO}_2@\text{TiO}_2:\text{Sm}^{3+}$ with different coating effects

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Abstract

Bright orange-red emitting Sm^{3+} doped $\text{SiO}_2@\text{TiO}_2$ hybrid materials have been synthesized through solvothermal coating method. The effect of the ethanol/ H_2O solvent ratios on the morphology and microstructure has been investigated. And a systematic study of photo-degradation and photoluminescence performance of $\text{SiO}_2@\text{TiO}_2:\text{Sm}^{3+}$ with different coating effect is performed. The luminescence intensity increased with the decrease in the amount of H_2O due to the uniform dispersion of $\text{TiO}_2:\text{Sm}^{3+}$ on the SiO_2 surface. However, the increase in the amount of H_2O is beneficial to the improvement of the photo-degradation efficiency of methyl orange, the best efficiency reaches to 90.3% under 30 min simulated solar light irradiation. Moreover, the effect of Sm^{3+} doping concentration on particle size, emission intensity and photocatalysis has been discussed. The results manifested that the presence of Sm^{3+} ions not only endows the composite materials with luminescence properties but also enhances its photocatalytic activity, however, appropriate doping concentration is necessary.

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