

**The Synthesis of Cu<sub>2</sub>O Nano-spheres Decorated with TiO<sub>2</sub> Nano-islands, their  
Enhanced Photoactivity and Stability under Visible Light Illumination, and their  
Post-illumination Catalytic “Memory”**

Lingmei Liu<sup>1</sup>, Weiyi Yang<sup>1</sup>, Qi Li<sup>1,\*</sup>, Shian Gao<sup>1</sup>, and Jian Ku Shang<sup>1,2</sup>

*<sup>1</sup>Environment Functional Materials Division*

*Shenyang National Laboratory for Materials Science*

*Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016, China;*

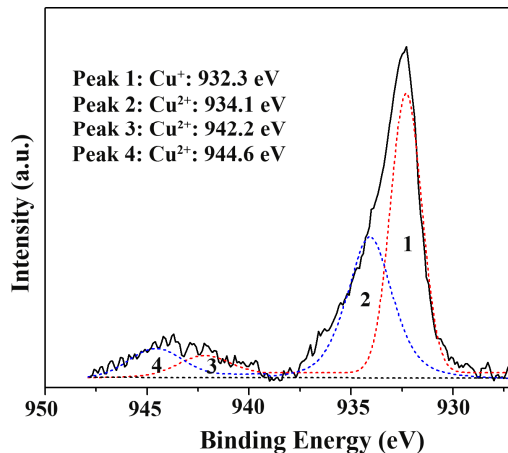
*<sup>2</sup>Department of Materials Science and Engineering*

*University of Illinois at Urbana-Champaign, Urbana, Illinois 61801, USA.*

\*Corresponding author: E-mail address: [qili@imr.ac.cn](mailto:qili@imr.ac.cn) (Q. Li)

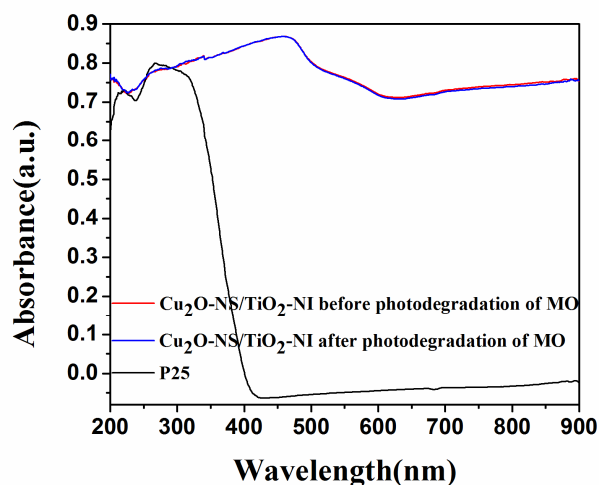
Phone: +86-24-83978028, Fax: +86-24-23971215.

Postal address: 72 Wenhua Road, Shenyang, Liaoning Province, 110016, P. R. China.



**Figure S1.** The high resolution XPS scans over Cu  $2p_{3/2}$  peak after the photocatalytic degradation of MO.

Figure S1 showed the high resolution XPS scans over Cu  $2p_{3/2}$  peak of Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI photocatalyst after its photocatalytic degradation of MO. It could be seen that the Cu  $2p_{3/2}$  peak had similar shape before and after the photocatalytic degradation of MO (see Figure 3c of high resolution XPS scans over Cu  $2p_{3/2}$  peak of Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI photocatalyst before its photocatalytic degradation of MO in the main manuscript for comparison). The Cu<sup>+</sup>/Cu<sup>2+</sup> ratio (determined by the ratio of the peak 1 area to peak 2 area) was ~ 1.4 and 1.2 before and after the photocatalytic degradation of MO, respectively. So the Cu<sup>+</sup>/Cu<sup>2+</sup> ratio was also similar before and after the photocatalytic degradation of MO. Thus, this XPS analysis result provided a further evidence of our material's stability.



**Figure S2.** UV-vis light absorbance spectra of the Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI photocatalyst before and after the photocatalytic degradation of MO, compared with that of Degussa P25 TiO<sub>2</sub> nanoparticles.

Figure S2 showed the UV-vis light absorbance spectra of the Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI photocatalyst before and after the photocatalytic degradation of MO, compared with that of Degussa P25 TiO<sub>2</sub> nanoparticles. It is clear that the optical properties of the Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI photocatalyst had no obvious changes before and after the photocatalytic degradation. Thus, it also supported our finding that the Cu<sub>2</sub>O-NS/TiO<sub>2</sub>-NI composite photocatalyst was stable during the photocatalytic reactions.