catalysts

MDPI

Article

The Roles of Graphene and Ag in the Hybrid $Ag@Ag_2O$-Graphene for Sulfamethoxazole Degradation

Li Zhou [1,2], Guoyan Zou [1,2,*] and Huiping Deng [3,*]

[1] Institute of Eco-environment and Plant Protection, Shanghai Academy of Agricultural Sciences, Shanghai 201403, China; zhouli@saas.sh.cn (L.Z.)
[2] Shanghai Engineering Research Centre of Low-carbon Agriculture (SERCLA), Shanghai 201415, China
[3] College of Environmental State Key Laboratory of Pollution Control and Resource Reuse (Tongji University), Shanghai 200092, China
* Correspondence: zouguoyan@263.net (G.Z.); denghuiping@tongji.edu.cn (H.D.); Tel.: +86-021-6220-2448 (H.D.); Tel.: +86-021-6220-2614 (G.Z.)

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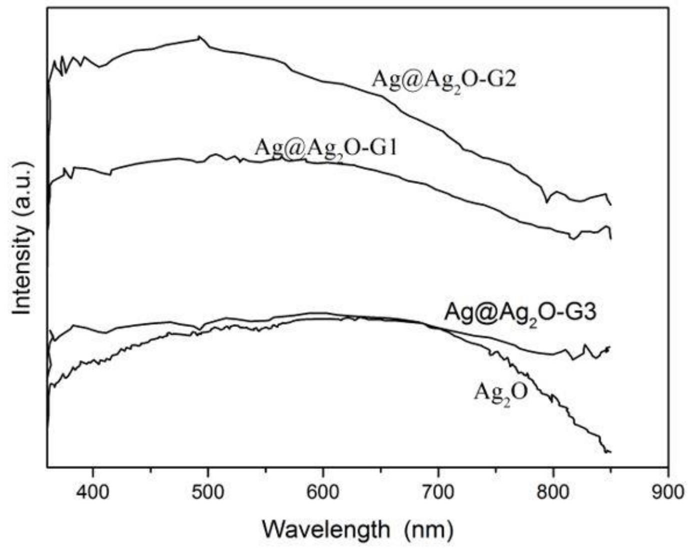

Figure S1. UV-vis spectra of Ag_2O, $Ag@Ag_2O$-G1, $Ag@Ag_2O$-G2 and $Ag@Ag_2O$-G3.

The UV-vis diffuse reflectance spectra of the series photocatalysts are illustrated in Figure S1. The pure Ag_2O showed strong absorption in ultraviolet and visible-light region that should be due to its narrow bad gap [1]. After loading different amount of graphene and Ag^0 on the Ag_2O, there are apparent increase in the light absorption for $Ag@Ag_2O$-G1and $Ag@Ag_2O$-G2, while the $Ag@Ag_2O$-G3 showed slight increase in the light absorption, which may be owing to the too much graphene loading [2]. It should be noted that the above light absorption order was consistent with the photocatalytic activities of photocatalysts, suggested that the increase light response was helpful for the enhancement of the photocatalytic performance.

Table S1. The rate constants and R^2 of first order kinetic reaction for Ag_2O, $Ag@Ag_2O$-G1, $Ag@Ag_2O$-G2 and $Ag@Ag_2O$-G3 to degrade SMX.

Light Source	Simulated Solar Light				Visible Light			
Photocatalysts	Ag_2O	$Ag@Ag_2O$-G1	$Ag@Ag_2O$-G2	$Ag@Ag_2O$-G3	Ag_2O	$Ag@Ag_2O$-G1	$Ag@Ag_2O$-G2	$Ag@Ag_2O$-G3
$K\times10^{-2}(min^{-1})$	1.57	3.53	4.51	2.69	1.22	3.40	3.79	2.78
R^2	0.965	0.982	0.955	0.978	0.984	0.989	0.953	0.973

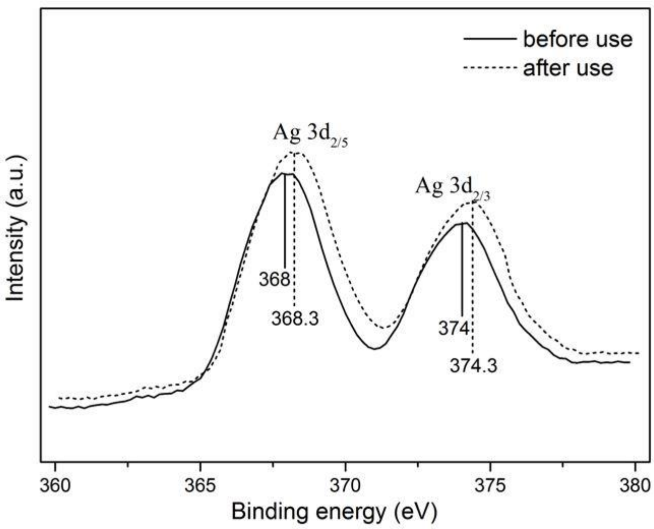

Figure S2. XPS spectra of Ag3d in Ag@Ag_2O-G2 before and after recycle use.

Compared with the XPS spectrum of Ag 3d in the original Ag@Ag_2O-G2 (368 eV and 374 eV for Ag $3d_{2/5}$ and Ag $3d_{2/3}$, respectively), the Ag 3d of used Ag@Ag_2O-G2 shifted to a higher binding energy (368.3 eV and 374.3 eV for Ag $3d_{2/5}$ and Ag $3d_{2/3}$, respectively, as shown in Figure S2). Because of the higher binding energy of Ag 3d electrons of Ag^0 than that of Ag^+, the shift of the Ag 3d peak may indicate the formation of more Ag^0 during the photocatalytic process [3], which could explain the change of adsorption ability and photocatalytic activities of Ag@Ag_2O-G2.

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