

# Enhanced reverse saturable absorption in graphene/Ag<sub>2</sub>S organic glasses

## Supplementary Material

Qiuyun Ouyang, Xinpeng Di, Zhenyu Lei, Lihong Qi, Chunyan Li, Yujin Chen\*

*Key Laboratory of In-Fiber Integrated Optics of Ministry of Education, College of*

*Science, Harbin Engineering University, Harbin 150001, China*

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\* Corresponding author. Tel/Fax: +86 451 82519754. E-mail address: [chenyujin@hrbeu.edu.cn](mailto:chenyujin@hrbeu.edu.cn) (Y. J. Chen).

## NLA properties of Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in DMF

Fig. S1 shows the open-aperture Z-scan experimental data and theoretical curves (solid line) of Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in dimethylformamide (DMF). In the Z-scan measurements, to keep closer linear transmittance with the (G/Ag<sub>2</sub>S)<sub>7.8</sub>/PMMA, we controlled the concentrations of Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in DMF to be 0.5 mg/mL, 0.03 mg/mL, and 0.08 mg/mL, respectively. The input energy was 66 μJ. It is obvious that the dip of the open-aperture Z-scan curve for the G/Ag<sub>2</sub>S solution in DMF is the largest, suggesting that the G/Ag<sub>2</sub>S solution in DMF exhibits the strongest nonlinear absorption properties.

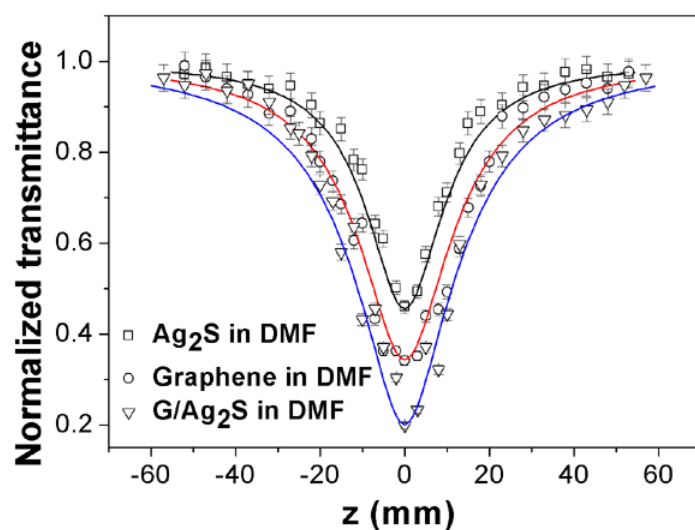


Fig. S1 (Color online) Comparison of open-aperture Z-scan curves among Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in DMF.

The values of linear transmittance  $T_0$ , linear absorption  $\alpha_0$  at 532 nm, and effective nonlinear absorption (NLA) coefficient  $\beta_{eff}$  of Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in DMF were listed in Table S1. Though  $T_0$  value of the G/Ag<sub>2</sub>S ( $T_0 = 47.3\%$ ) solution in DMF is smaller than those of Ag<sub>2</sub>S solution in DMF ( $T_0 = 52.8\%$ ) and

graphene solution in DMF ( $T_0 = 55.9\%$ ), the  $\beta_{eff}$  value of the G/Ag<sub>2</sub>S solution in DMF is approximately 5.0 and 2.9 times larger than those of Ag<sub>2</sub>S solution in DMF and graphene solution in DMF, respectively. The results above indicates that the G/Ag<sub>2</sub>S solution in DMF exhibit enhanced NLA properties compared to Ag<sub>2</sub>S solution in DMF and graphene solution in DMF.

**Table S1** Comparison of linear transmittance  $T_0$ , linear absorption coefficient  $\alpha_0$  at 532 nm, and nonlinear absorption coefficient  $\beta_{eff}$  among Ag<sub>2</sub>S, graphene, and G/Ag<sub>2</sub>S solution in DMF.

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Samples	$T_0$ (%)	$\alpha_0$ (cm <sup>-1</sup> )	$\beta_{eff}$ (cm/GW)
Ag <sub>2</sub> S in DMF	52.8	0.638	21.4
Graphene in DMF	55.9	0.582	37.5
G/Ag <sub>2</sub> S in DMF	47.3	0.748	107

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The concentration of Ag<sub>2</sub>S solution in DMF, graphene solution in DMF, and G/Ag<sub>2</sub>S solution in DMF are 0.5 mg/mL, 0.03 mg/mL, and 0.08 mg/mL, respectively.

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