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Supporting information

Synthesis of Highly Chemiluminescent Graphene Oxide/Silver Nanoparticles Nano-Composites and Their Analytical Applications

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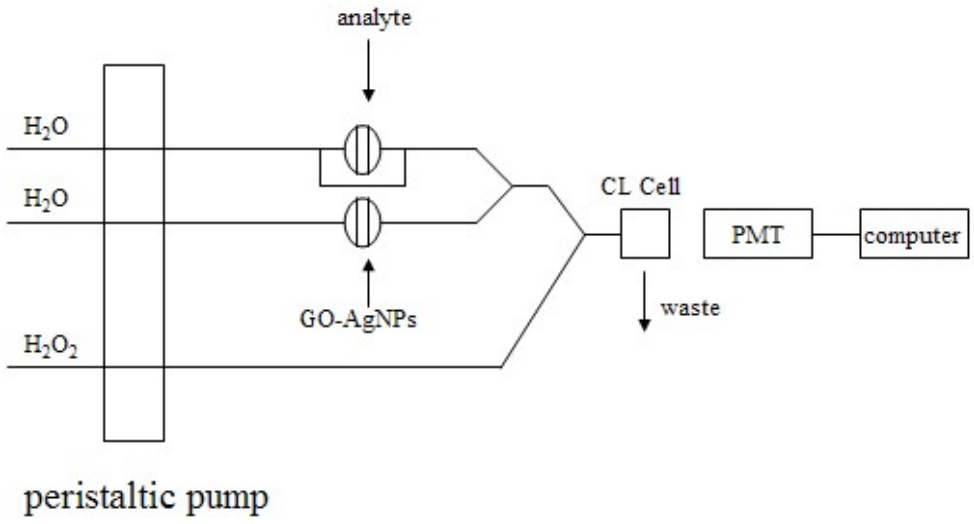

Fig. S1 Schematic diagram of the flow injection CL detection system

Size distribution diagram of AgNPs

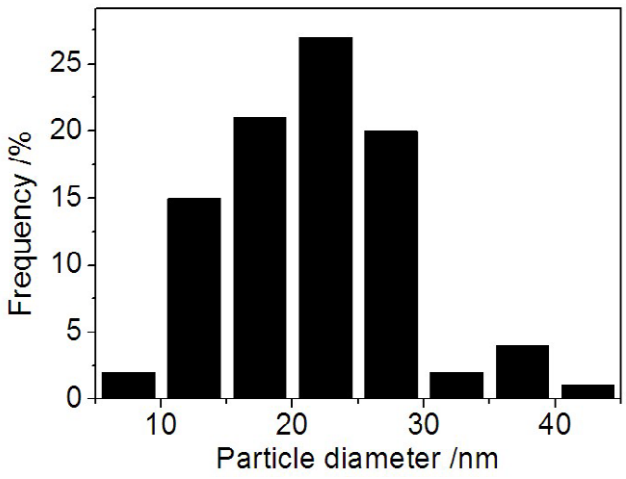

Fig. S2 The size distribution diagram of AgNPs

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Effect of the ratio of water/ethanol on the reaction rate

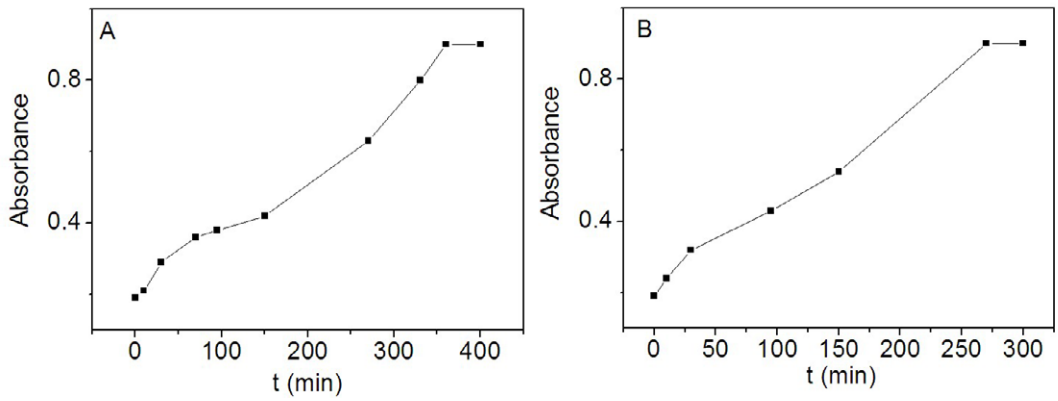

Fig. S3 Variation of the absorbance at 440 nm with different water/ethanol ratio, (A) 5:2, (B)1:1.

Since the absorption of AgNPs could distinguish from GO, luminol and its oxidation products, it was convenient to monitor the reduction process of $AgNO_3$ by luminol via measure the absorbance of AgNPs at 440 nm. When the absorption of AgNPs was not changed with time, suggesting the reaction was complete. The effect of water/ethanol ratio on the reduction reaction was studied as shown in Fig. S3, it was found that the relatively low ratio of water/ethanol exhibited a higher reaction rate and the relatively high ratio exhibited a lower reaction rate, which was due to the polarity, steric hindrance, electrostatic effect, etc.

Optical measurement

The CL spectrum was measured on a model RF 5301 PC spectrofluorometer (Shimadzu, Japan) when Xe lamp was turned off. The obtained CL spectrum was shown in Fig. S4.

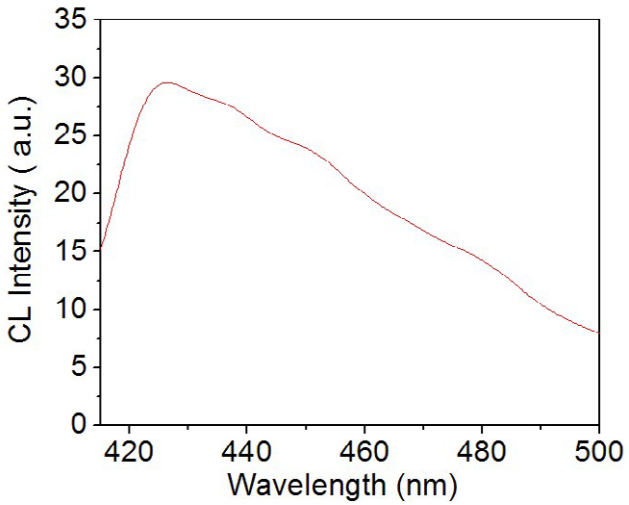

Fig. S4 CL spectrum for the reaction of GO-AgNPs nano-composites dissolved in 0.1 mol/L NaOH with 0.01 mol/L H_2O_2

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The content of luminol in the GO-AgNPs nanocomposites

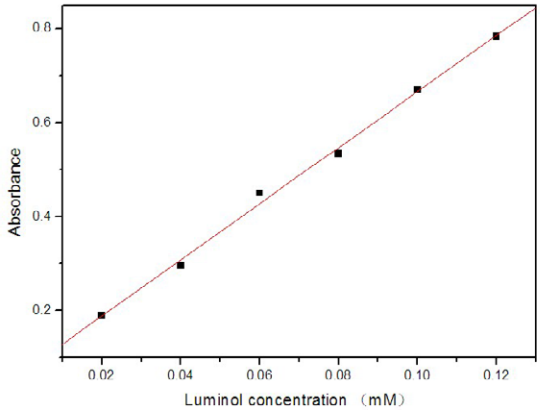

Fig. S5 UV-vis absorbance of luminol at 300 nm with different concentrations (0.02, 0.04, 0.06, 0.08, 0.10, 0.12 mM)

Luminol had a strong UV-Vis absorption peak at 300 nm, whereas the UV-Vis absorption of GO at 300 nm was weak. Thus it was a good opportunity for us to quantify the content of luminol in the GO-AgNPs nanocomposites by the UV-Vis absorption difference between GO and luminol.

2 mL of as-prepared nanocomposites were firstly centrifuged (12500 rpm), washed twice with water and resuspended in 2 mL of 0.1 M NaOH. Afterwards, the absorbance of the nanocomposites at 300 nm was measured (A1=1.08). Meanwhile, the absorbance of GO with the same concentration of GO as nanocomposites at 300 nm was also measured (A2=0.344). Therefore, the real absorbance of luminol in the nanocomposites equals 0.736 (A1-A2).

To quantify the content of luminol in the nanocomposites, a series of standard solution of luminol was prepared by serial dilution and their absorbance at 300 nm was also detected as shown Fig. S5. The regression equation was A_{300}=0.0696 + 5.962 C. Thus the luminol remained in 2 mL nanocomposites was approximately 0.112 mM.

Effect of 3-aminophthalate on the CL of luminol

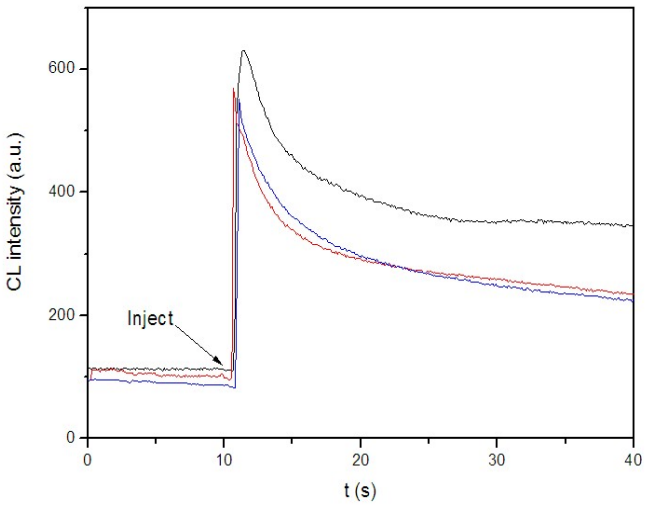

Fig. S6 CL kinetic curves of reaction of 1 mM luminol with 1 mM H_2O_2 in the absence (black line) and presence of 1 mM 3-aminophthalate (red line) and 0.1 mM 3-aminophthalate (blue line).

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The effect of 3-aminophthalate on the chemiluminescence (CL) of luminol was explored by static injection as shown in Fig. S6. The result demonstrated that 3-aminophthalate only slightly affected the CL of luminol.