Supporting Information

In Situ Tracking Photodegradation of Trace Graphene Oxide by the Online Coupling of Photoinduced Chemical Vapor Generation with a Point Discharge Optical Emission Spectrometer

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1. Characterization and Off-line Quantification of GO

The GO samples for AFM measurements were prepared by depositing GO suspension onto a freshly mica plate and drying in air. AFM measurements were carried out using a Multimode 8 with a Nanoscope V controller (Bruker, CA). The concentrations of the NOM stock solution and GO in the stock solution and pristine or fractioned self-prepared colloids were directly quantified using a TOC analyzer (TOC-L, Shimadzu, Japan). Zeta potential measurements were performed on a Malvern Zetasizer (Nano ZS ZEN3600, Malvern, UK). The instrumental parameters above were referred to the instructions of manufacturers.

2. Effects of Main Degradation Parameters of PI-CVD on Its Photodegradation Efficiency

Figure S2B shows that the emission intensity remarkably increases with H_2O_2 concentration from 50 to 200 mM and then gradually decreases over 200 mM H_2O_2. This effect is consistent with the previous study that excessive H_2O_2 were found to scavenge reactive species such as •OH.[1] Therefore, 200 mM H_2O_2 was chosen for the subsequent experiments.

The effect of reaction time was adjusted by the flow rate of the reactant solution in the range of 0.3–0.7 mL/min. The results show that the emission intensity slightly decreases when the flow rate is higher than 0.4 mL/min (ca. 5.3 min), mainly due to the reduced residence time of GO in the area of the quartz reactor at higher flow rates.[2] Thus, the flow rate of the reactant solution was set as 0.4 mL/min in the following experiments.

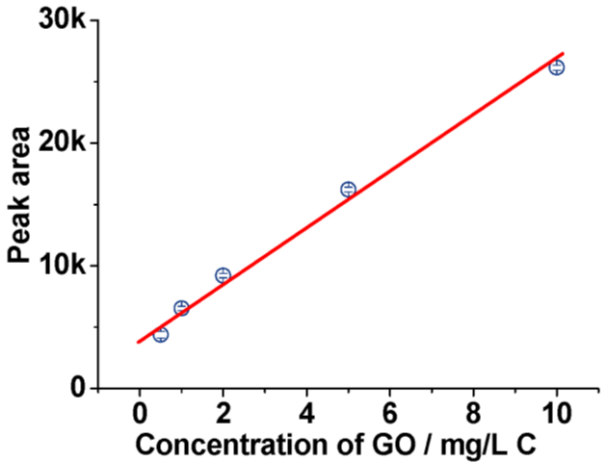

Figure S1. Calibration curve established by the proposed PI-CVG-PD-OES system (mean ± SD, n = 3).

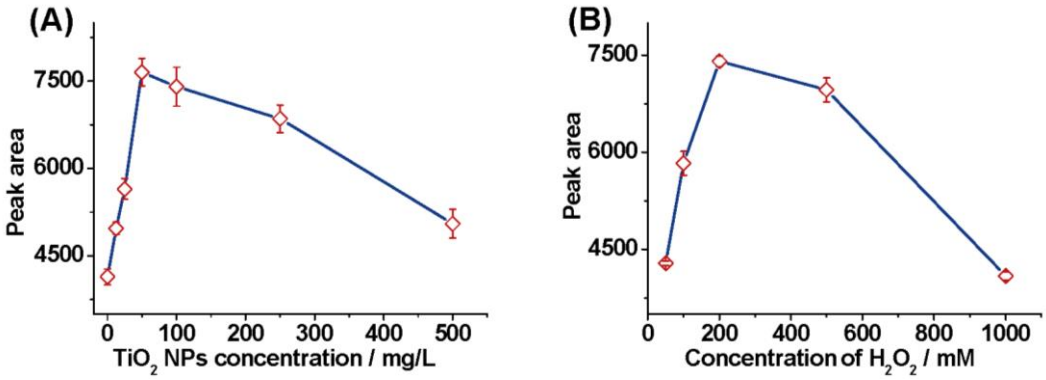

Figure S2. Effects of (A) TiO_2 NP concentration and (B) H_2O_2 concentration on the photodegradation efficiency of PI-CVG (mean ± SD, n = 3).

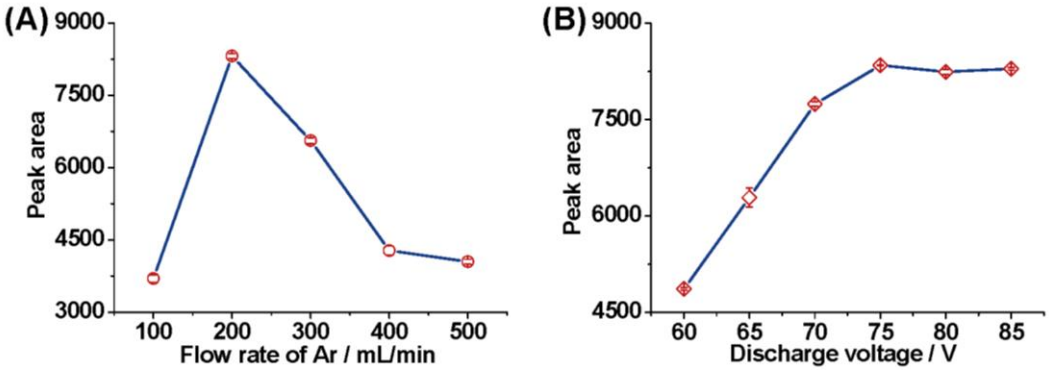

Figure S3. Effects of (A) flow rate of Ar gas as working gas and (B) discharge voltage on the sensitivity and stability of PD-OES. (mean ± SD, n = 3).

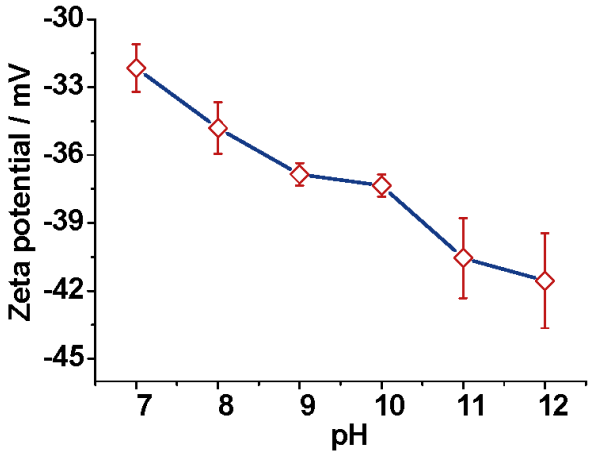

Figure S4. Zeta potentials of GO as a function of pH (mean ± SD, n = 3).

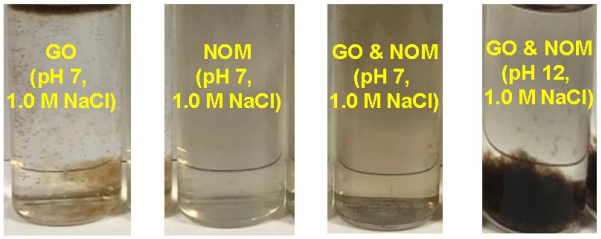

Figure S5. Photographs illustrating the salt-induced aggregation of GO or/and NOM under different pH conditions.

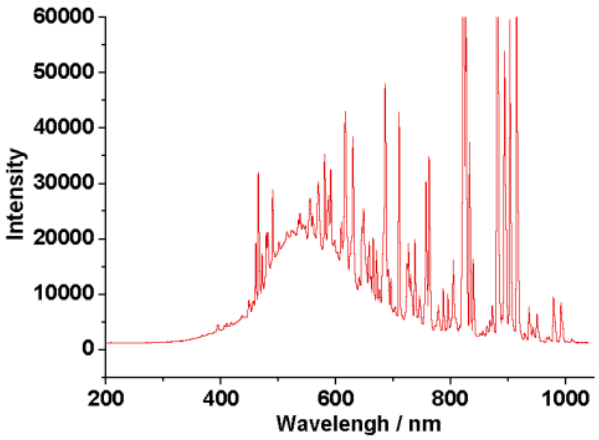

Figure S6. Emission spectra of the simulated sunlight irradiation.

References

1. Zhang, H.; Chen, S.; Zhang, H. G,; Fan, X. F.; Gao, C.; Yu, H. T.; Quan, X. *Front. Environ. Sci. Eng.* **2019**, *13*, 18.
2. Zhang, S.; Tian, Y. F.; Yin, H. L.; Su, Y. B.; Wu, L.; Hou, X. D.; Zheng, C. B. *Environ. Sci. Technol.* **2017**, *51*, 9109−9117.