Electronic Supplementary Material (ESI) for Photochemical & Photobiological Sciences.

Supporting Information

Plasmonic Photocatalysis: Complete Degradation of Bisphenol A by Gold Nanoparticle-Reduced Graphene Oxide Composite under Visible Light

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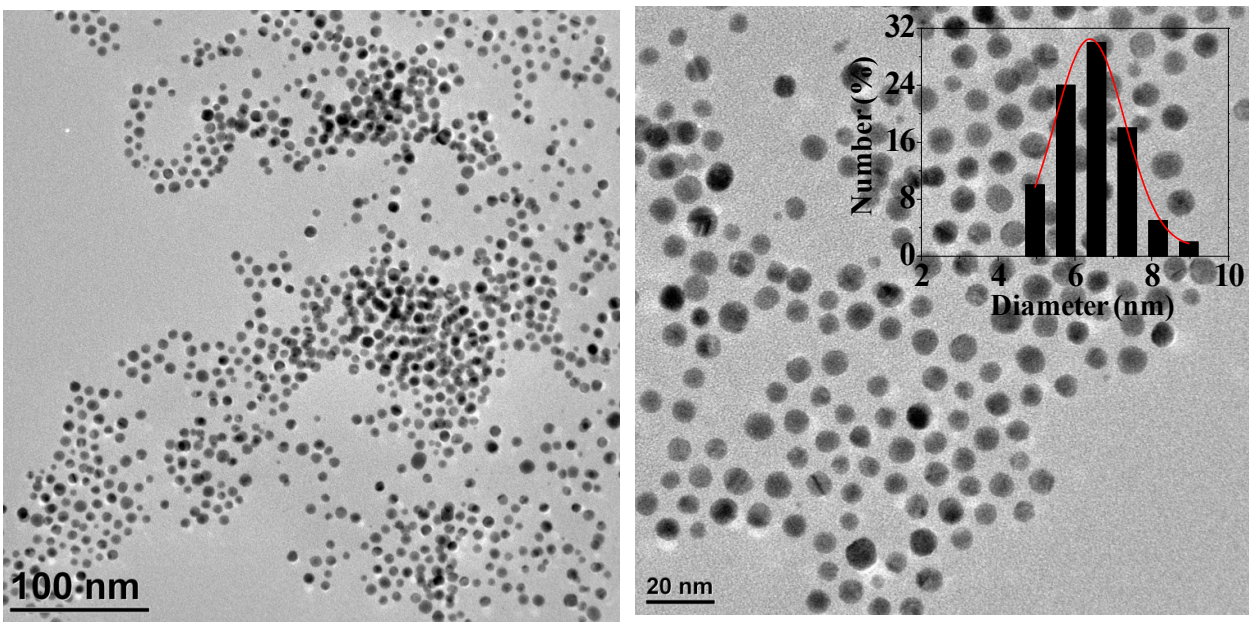

Figure S1. TEM image of silica coated Au nanoparticle at two different magnifications. Silica shell is too thin (< 5 nm) to observe under TEM. Inset shows the particle size distribution with the average size on 7 nm.

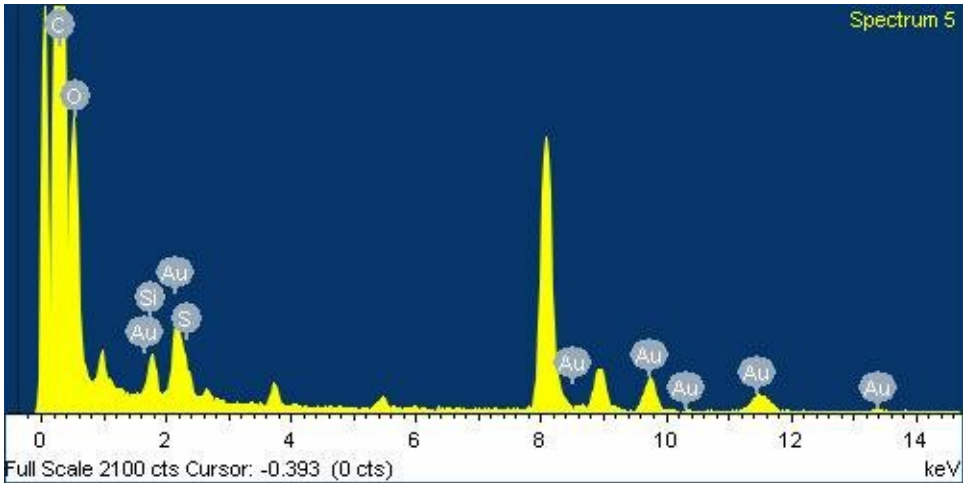

Figure S2. EDX of rGO/Au nanocomposite showing the presence of gold, silicon, sulphur and other elements.

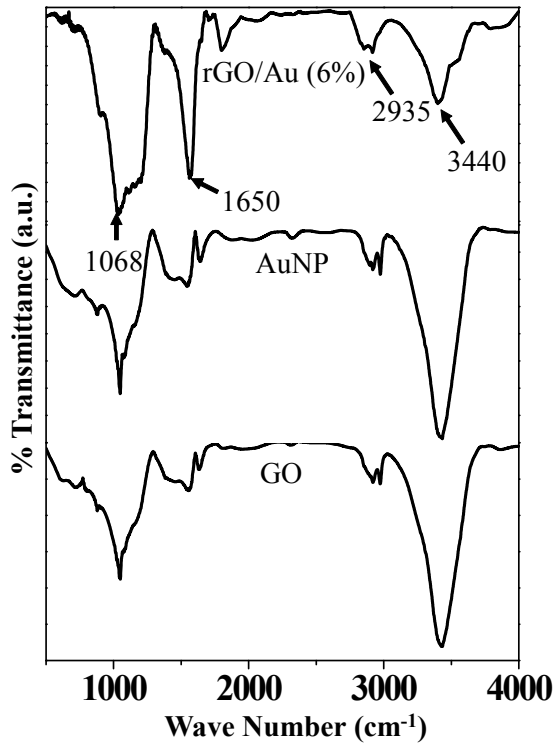

Figure S3. FTIR data of GO, silica coated Au and rGO/Au (6 %) nanocomposite. rGO/Au shows N-H vibration band at ~ 1650 cm^{-1} similar to silica coated Au nanoparticle and O-H vibration band at ~ 3440 cm^{-1}similar to GO.

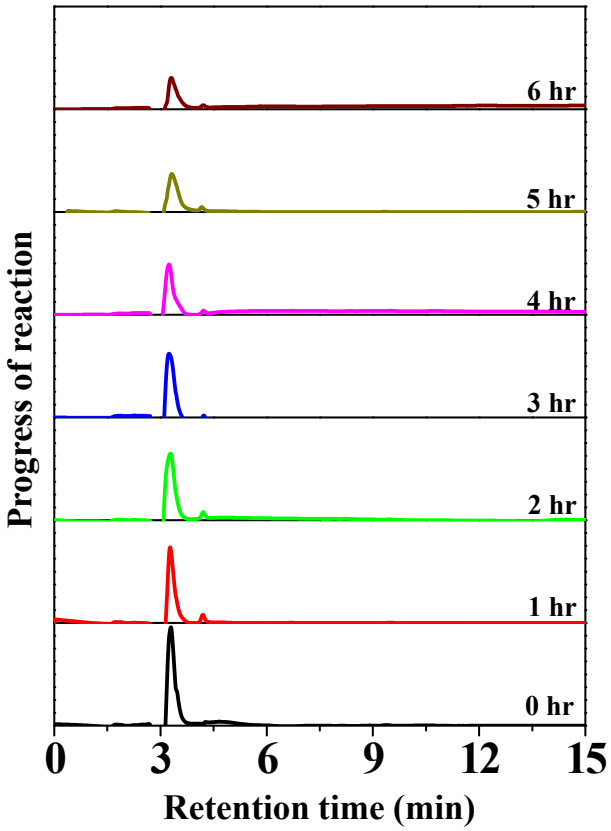

Figure S4. Monitoring of bisphenol A degradation by HPLC using UV-visible detector. Samples are collected at different times of visible light irradiation and detected at 280 nm. Here the photodegradation is studied in completely alcohol free condition.

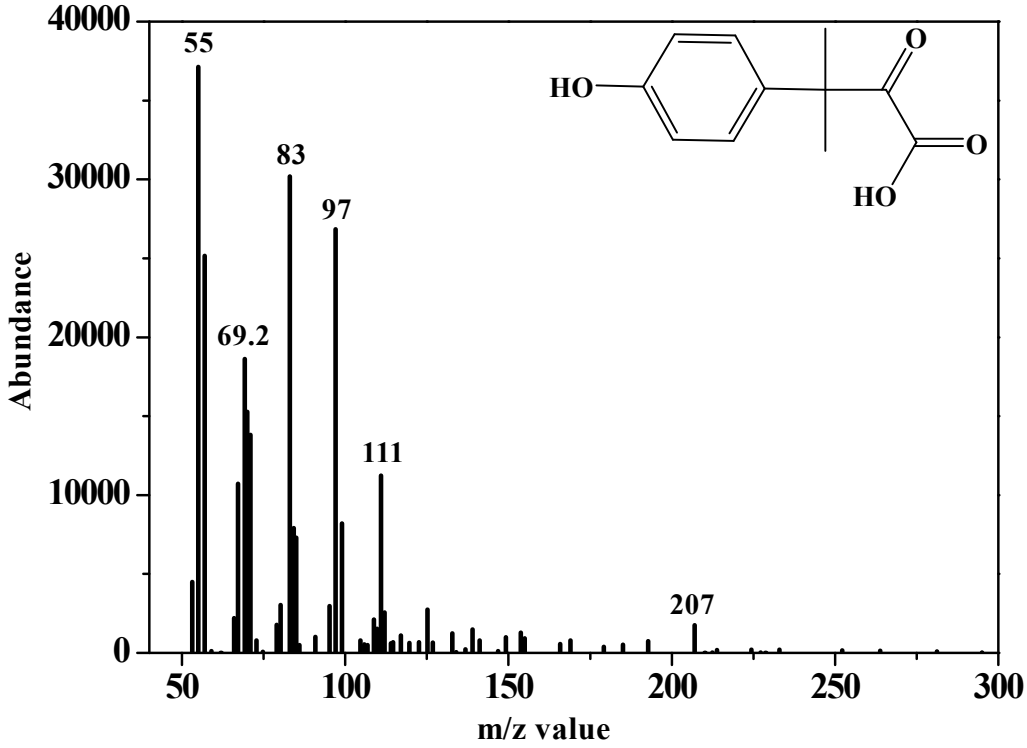

Figure S5. GC-MS spectrumshowing m/z value 207 that corresponds to molecular ion peak of3-(4-hydroxyphenyl)-3-methyl-2-oxobutanoic acid.

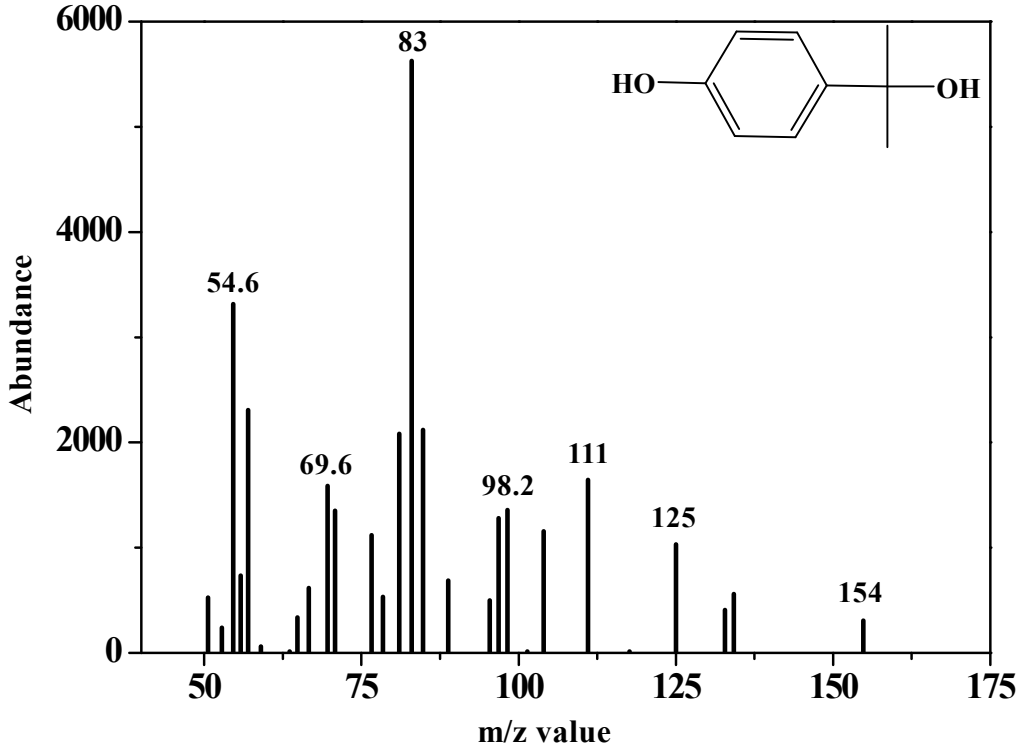

Figure S6. GC-MSspectrumshowing m/z value 154 that corresponds to molecular ion peak of 4-(2-hydroxypropan-2-yl) phenol.

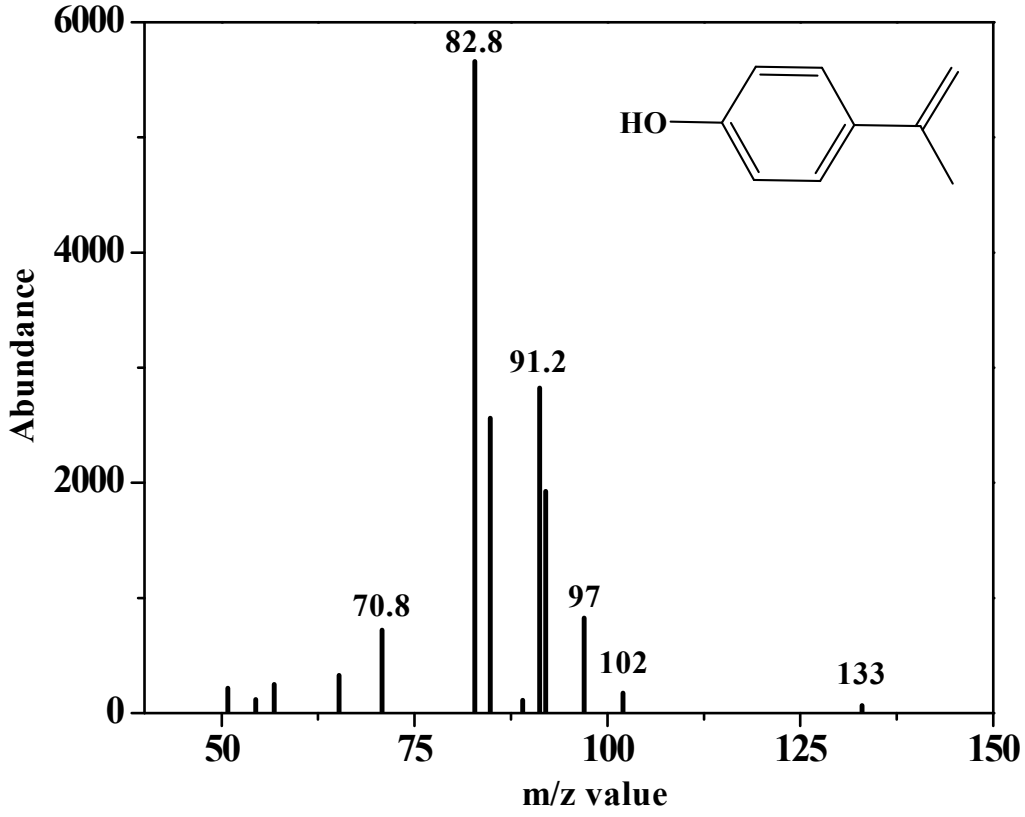

Figure S7. GC-MSspectrum showing m/z value 133 that corresponds to molecular ion peak of 4-(prop-1-en-2-yl) phenol.

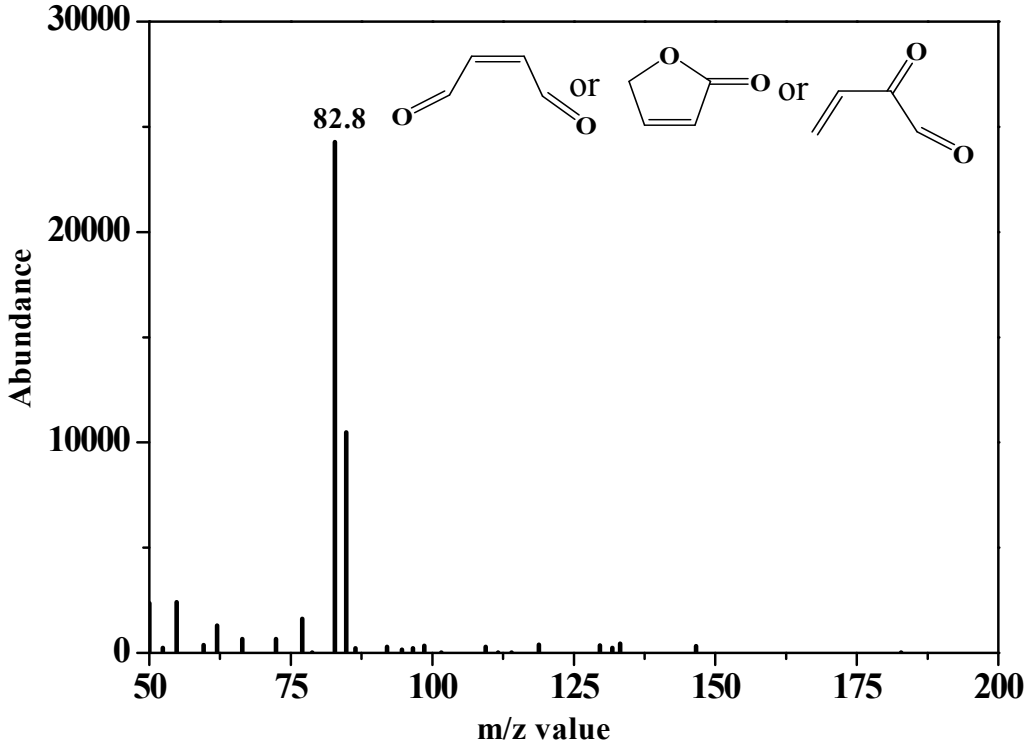

Figure S8. GC-MSspectrumshowing m/z value 83 that corresponds to molecular ion peak of aliphatic ketone/aldehyde.

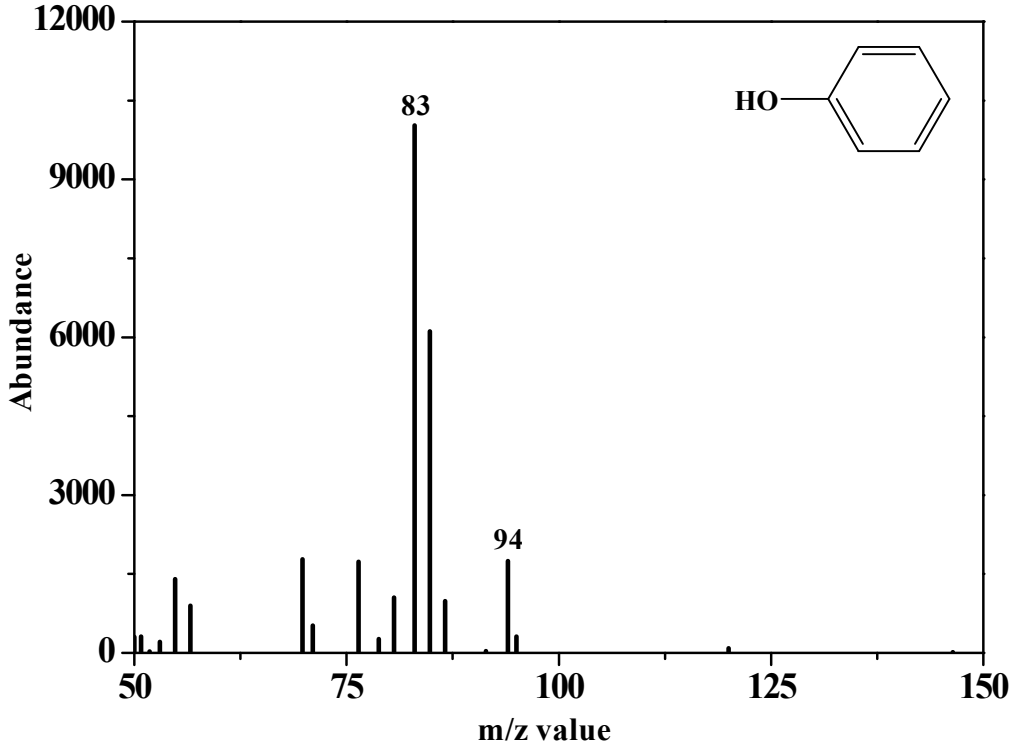

Figure S9. GC-MS spectrum showing m/z value 94 that corresponds to molecular ion peak of phenol.

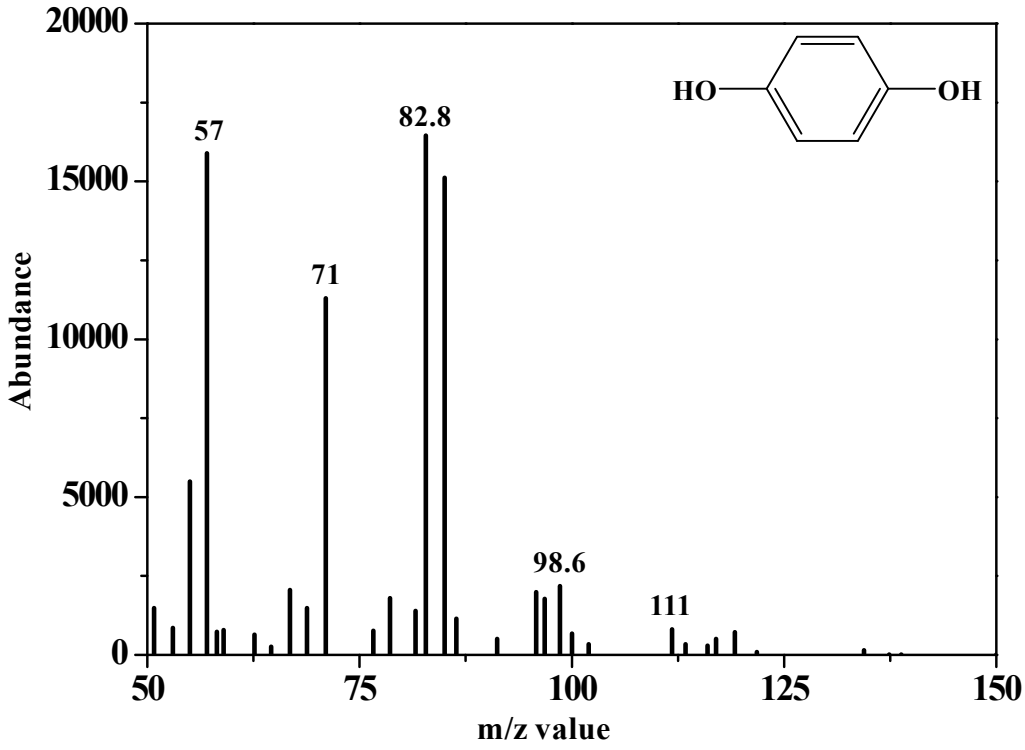

Figure S10. GC-MS spectrum showing m/z value 111 that corresponds to molecular ion peak of hydroquinone.

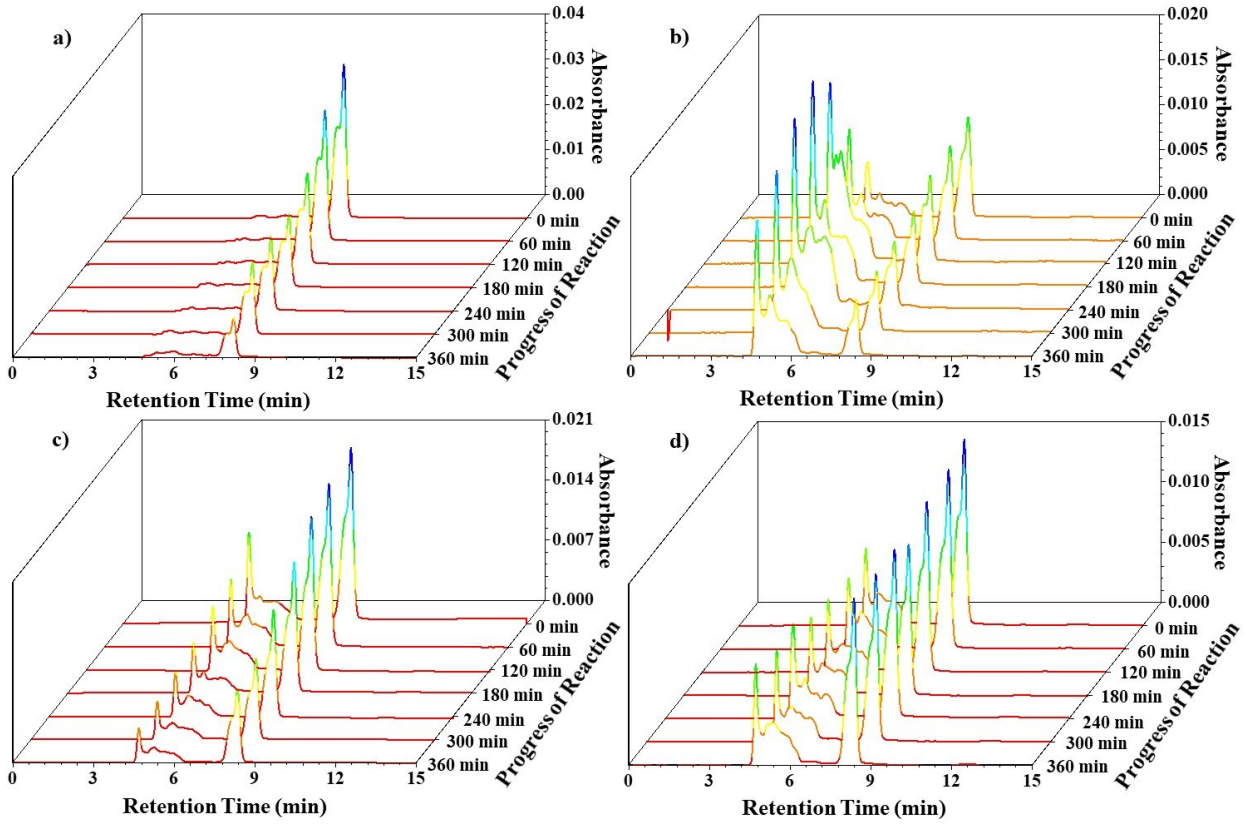

Figure S11. Monitoring of bisphenol A degradation by HPLC using UV-visible detector. The peak at 8.3 min corresponds to bisphenol A. Samples are collected at different times of light irradiation and detected at 278 nm. Degradation was carried out in a) UV light (light intensity ~ 0.5 mW/cm^2), b) blue light (light intensity ~ 0.44 mW/cm^2), c) green light (light intensity ~ 0.9 mW/cm^2), and d) red light (light intensity ~ 0.14 mW/cm^2). (Flow rate 0.5 mL/min and eluent is 80 % methanol).

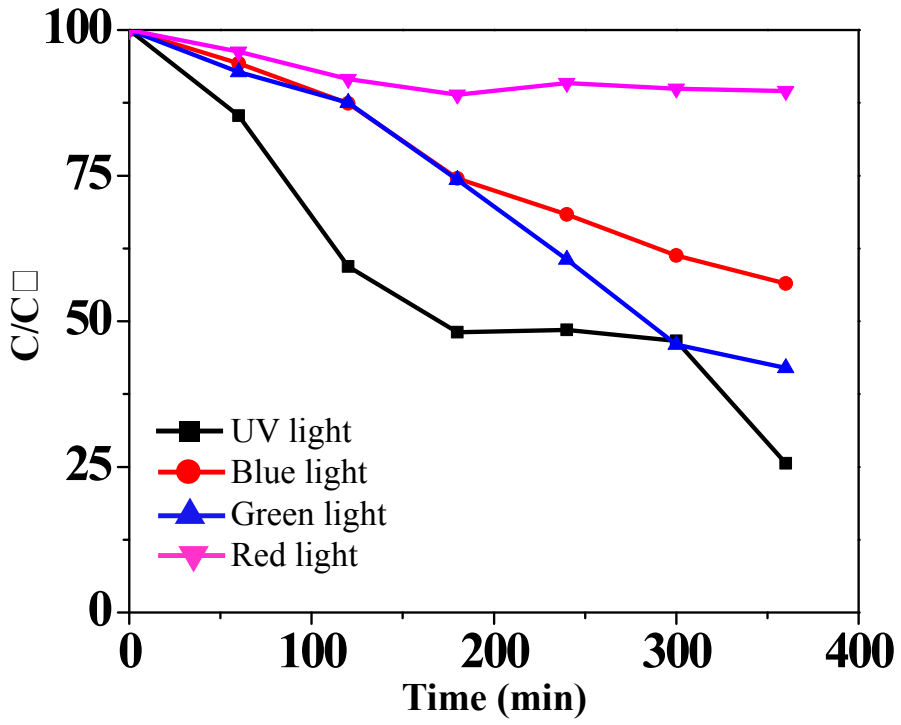

Figure S12. Light wavelength dependent photocatalytic degradation kinetics of bisphenol A by rGO/Au (6%) that is shown in Figure S11. Samples are collected at different times light irradiation and absorbance ratio of final to initial (C/C_0) is measured at 278 nm.

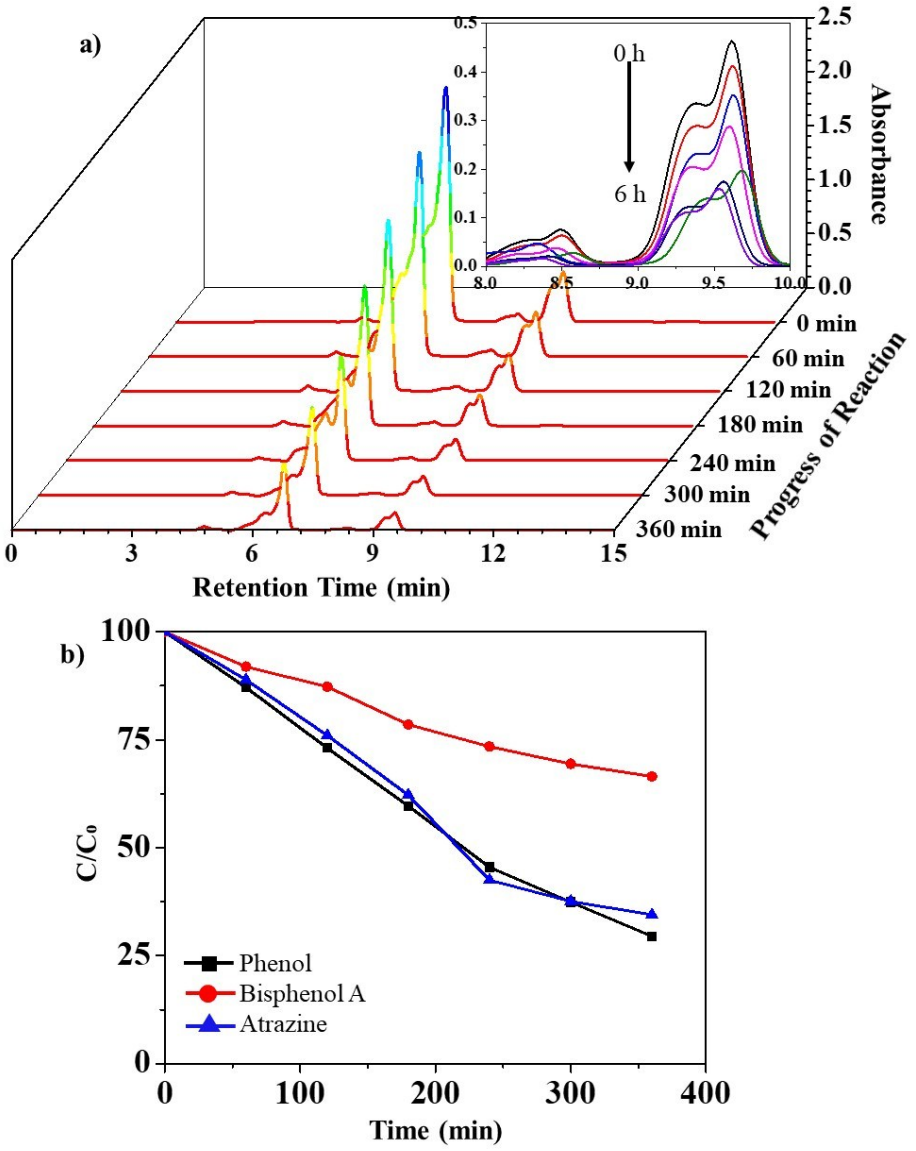

Figure S13. a) Monitoring of phenol, bisphenol A and atrazine degradation in their mixture by HPLC using the UV-visible detector. Samples are collected at different time point of visible light irradiation and detected at 220 nm. Degradation was carried out in 250 W Hg vapour lamp (visible light source with light intensity ~ 5 mW/cm^2). The peaks at 6.7, 8.5 and 9.5 min corresponding to phenol, bisphenol A and atrazine, respectively. Inset shows magnified image of retention time in the 8-10 min region. b) Kinetics of visible light photodegradation of phenol, bisphenol A and atrazine in their mixture, as shown in Figure 13 a.

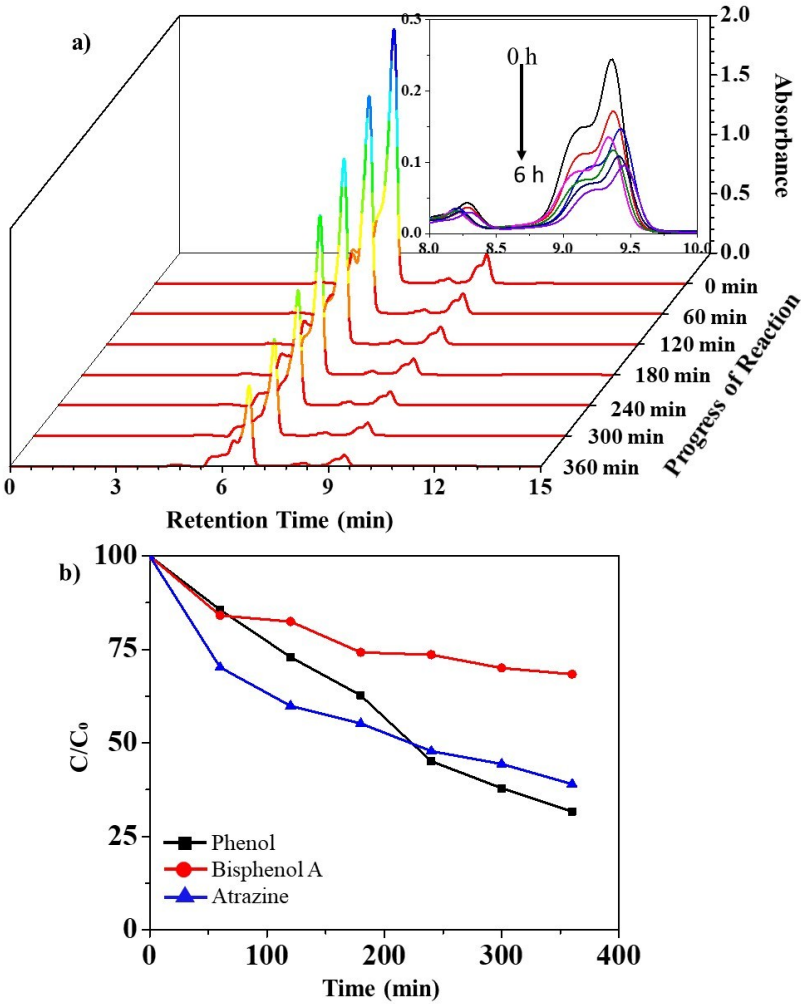

Figure S14. a) Monitoring of phenol, bisphenol A and atrazine degradation in their mixture under the condition similar to river water that contain cations and anions (such as Mg^{2+}, Na^{+}, K^{+}, $Fe^{2+/3+,}$ Cl^{-}, CO_3^{2-}, SiO_2 etc.) by HPLC. Samples are collected at different times of visible light irradiation and detected at 220 nm. Degradation was carried out in 250 W Hg vapour lamp (visible light source with light intensity ~ 5 mW/cm^2). (Flow rate 0.5 mL/min and eluent is 80 % methanol). The peaks at 6.7, 8.3 and 9.3 min correspond to phenol, bisphenol A and atrazine, respectively. Inset shows magnified portion of retention time at 8-10 min region. b) Kinetics of visible light photodegradation of phenol, bisphenol A and atrazine by rGO/Au (6%) as shown in Figure S14a.