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One Pot Synthesis of Au-ZnO Nanocomposite for Plasmon-Enhanced Sunlight Driven Photocatalytic Activity

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Supporting information

Supporting information S1:

Materials

All the reagents were of AR grade. Zinc sulfate [$ZnSO_4.2H_2O$], triethylamine and HAuCl4, Rhodamine B, methylene blue, congo red, methyl orange, rose bengal were purchased from E-Merck. Beakers and other glasswares (capacity 15 mL) were obtained from Blue Star India and they were properly cleaned with aqua regia, water and dried prior to their use.

Analytical Instrument

Powder X-ray diffraction (XRD) was carried out in a PW1710 diffractometer, a Philips, Holland, instrument. The XRD data were analyzed by using (JCPDS) software.

Reflectance spectra were monitored using DRS (Diffuse Reflectance Spectra) mode with a Cary model 5000 UV-vis-NIR spectrophotometer.

All absorption spectra were recorded in a chemito spectrophotometer (India) and 1 cm quartz cuvette eas used to take the solutions.

Field emission scanning electron microscopy (FESEM) was performed with a supra 40, Carl Zeiss Pvt. Ltd. Instrument, and an EDAX machine (Oxford link and ISIS 300) attached to the instrument was used to get the nanocrystal composition.

Transmission electron microscopy (TEM) was performed with an H-9000 NAR instrument, Hitachi, using an accelerating voltage of 300 kV.

The chemical state of the element on the surface of the nanomaterial was obtained X-ray photoelectron spectroscopy (XPS) measurements, carried out by a VG Scientific Escalab MK II spectrometer equipped with a Mg Kr excitation source (1253.6 eV) and a five-channeltron detection system.

Digital images were captured using a digital still camera (Sony Cyber-shot 8.2 megapixels).

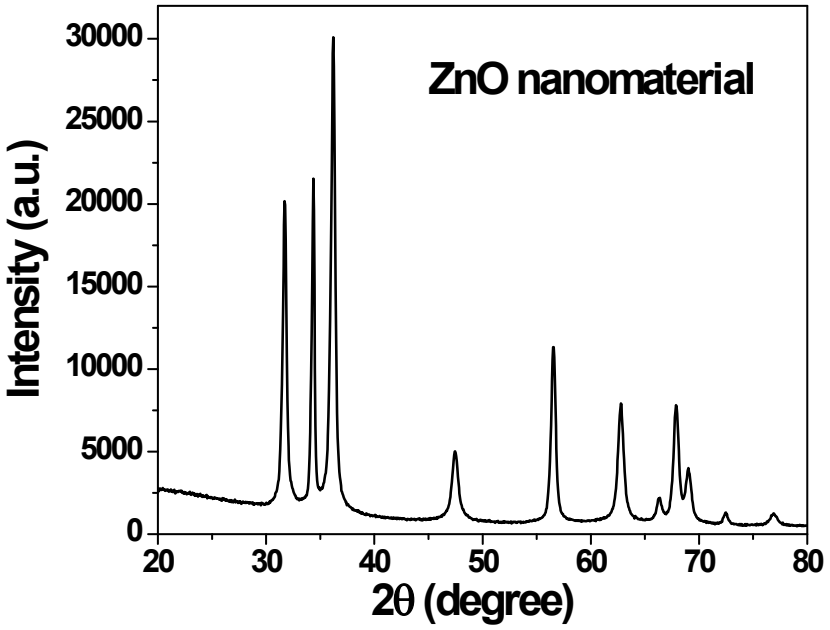

Figure S1: XRD pattern of ZnO nanomaterial.

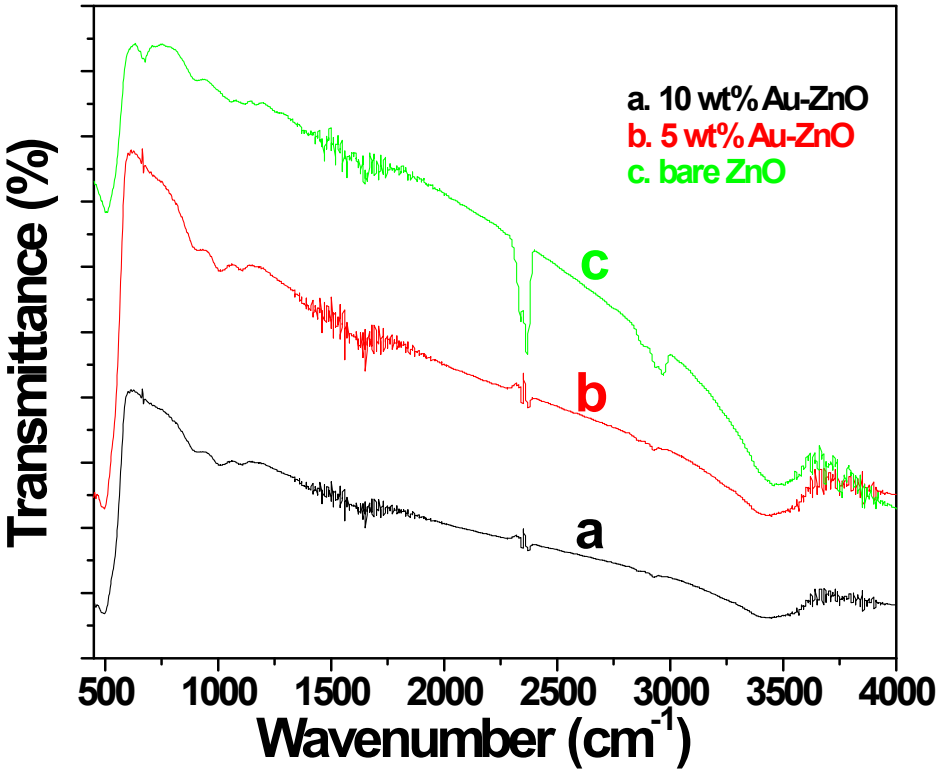

Figure S2: FTIR spectrum of ZnO nanomaterial, 5 wt% Au-ZnO nanocomposite, 10 wt% Au-ZnO nanocomposite.

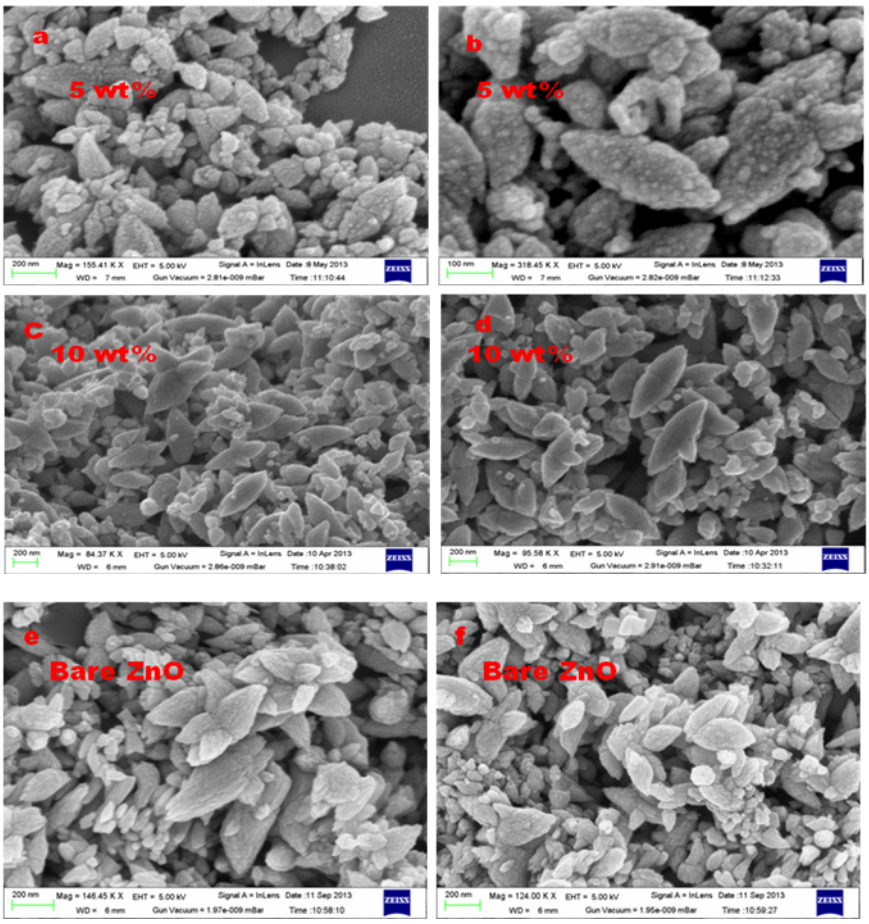

Figure S3: FESEM images (a), (b) Au-ZnO nanocomposite with 5 wt% Au; (c), (d) Au-ZnO nanocomposite with 10 wt%; (e), (f) bare ZnO.

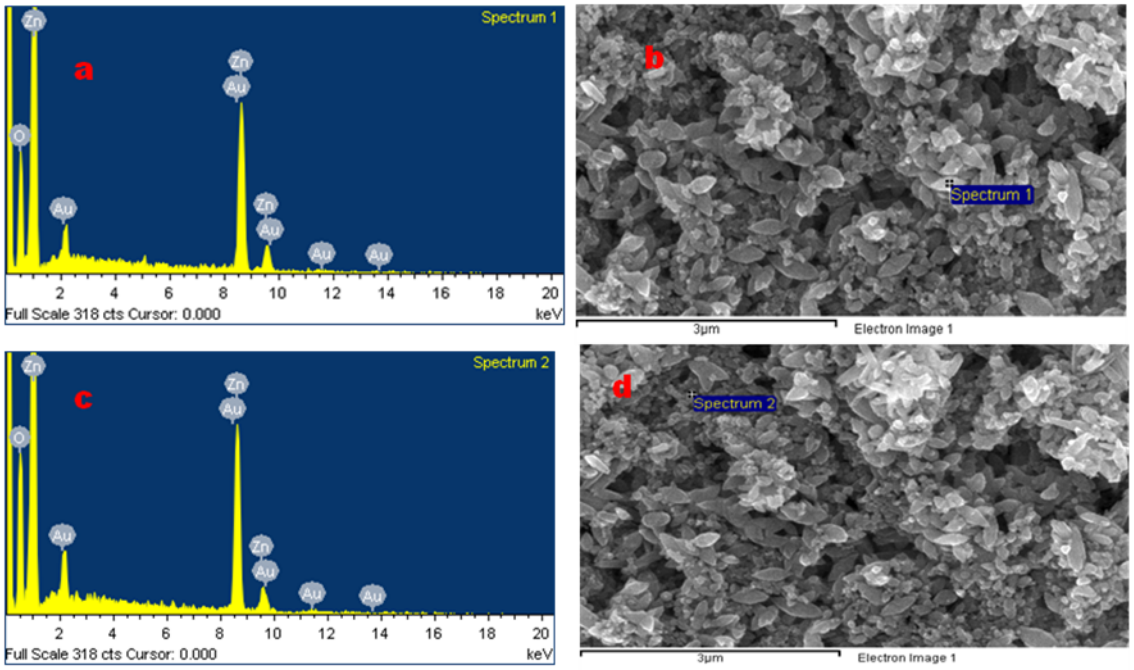

Figure S4: (a), (c) Point EDX of Au-ZnO nanocomposite and (b), (d) their corresponding scan area.

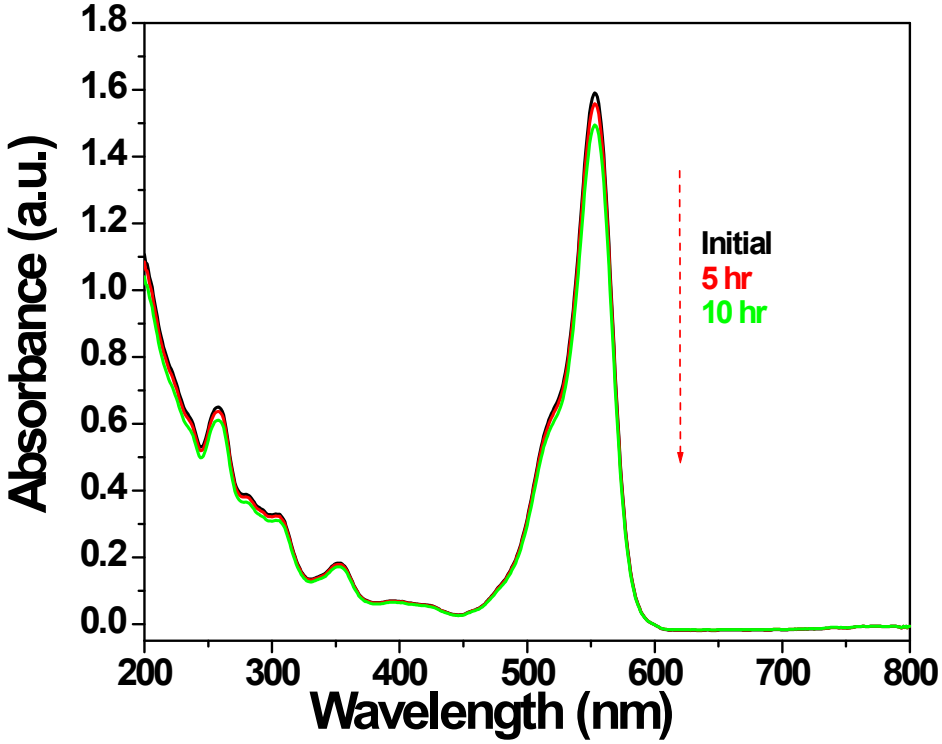

Figure S5: Photodegradation of RhB (2 x 10^{-5} M) under sunlight in absence of catalyst (blank test).

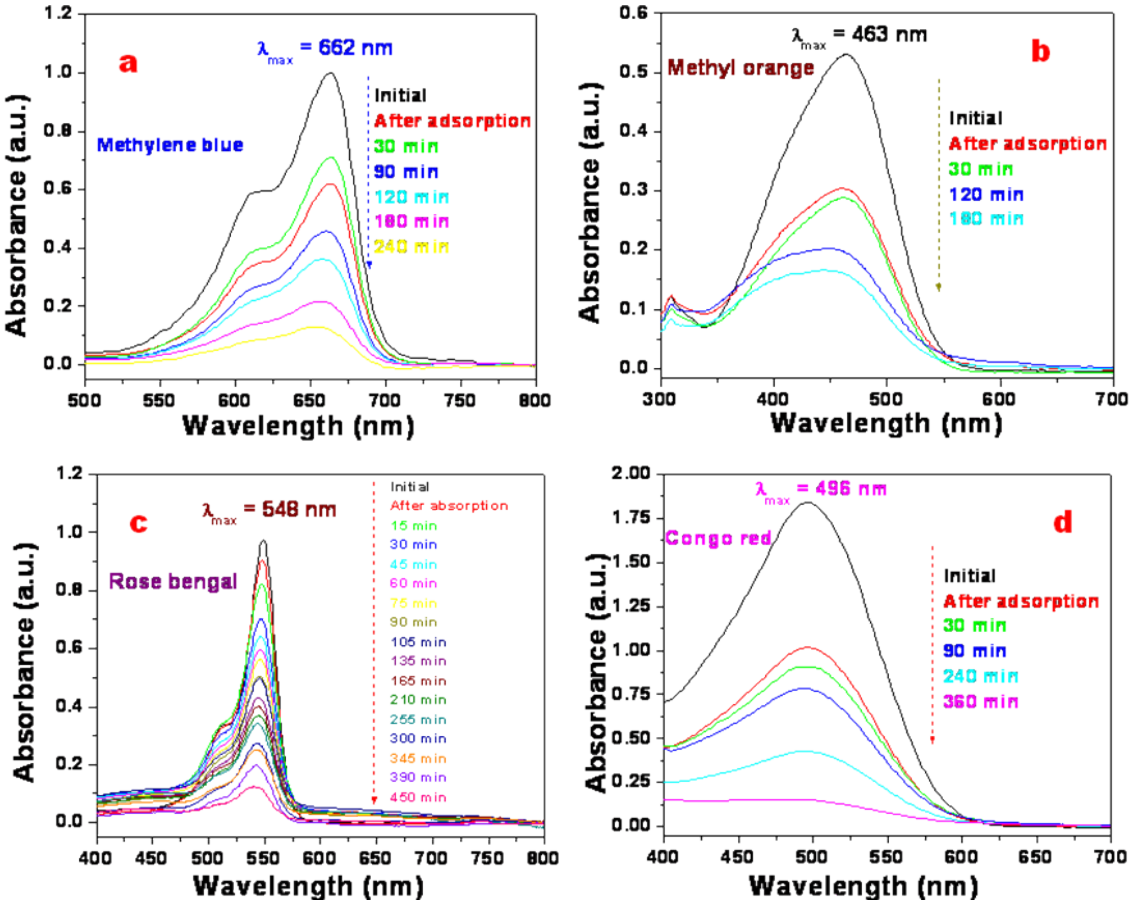

Figure S6: Photodegradation of (a) methylene blue (2 x 10^{-5} M), (b) methyl orange (10^{-5} M), (c) rose bengal (2 x 10^{-5} M), (d) congo red (10^{-4} M) under sunlight in presence of 0.05 g Au-ZnO (10 wt% Au) nanomaterial.

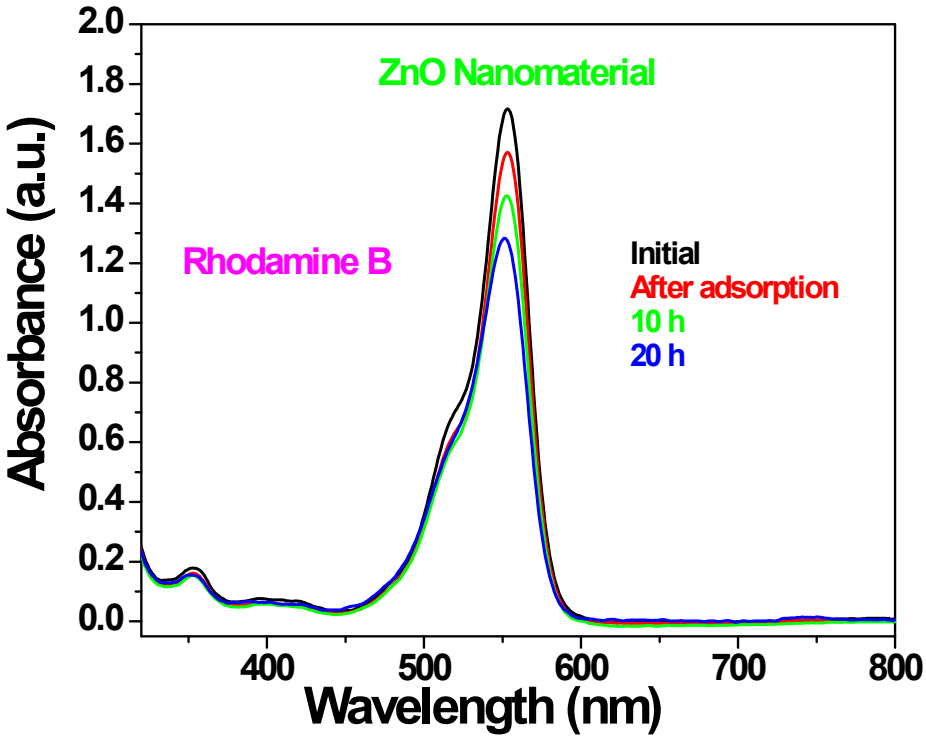

Figure S7: Photodegradation of RhB (2 x 10^{-5} M) under sunlight in presence of 0.05 g ZnO nanomaterial.

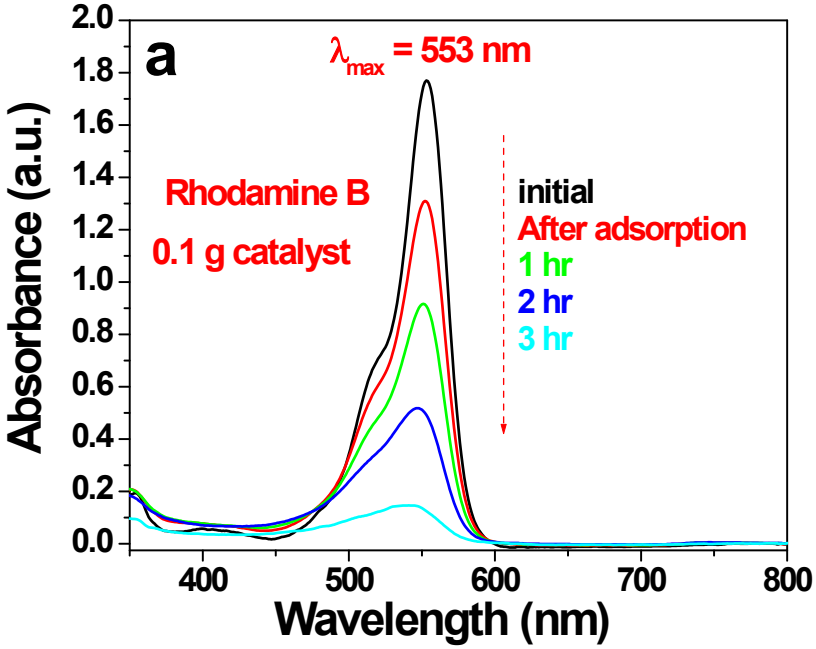

Figure S8: Photodegradation of RhB (2 x 10^{-5} M) under sunlight in presence of 0.1 g Au-ZnO (5 wt% Au) nanomaterial.

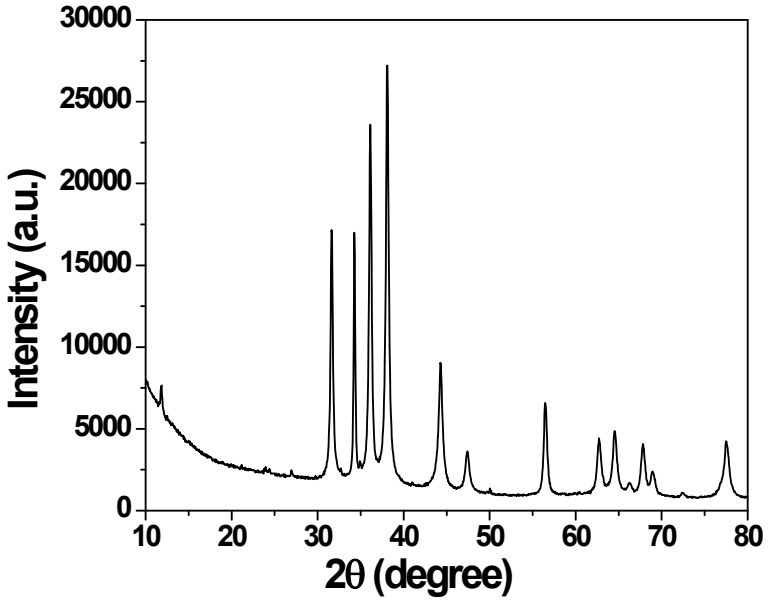

Figure S9: XRD pattern of Au-ZnO after photocatalysis.