

Supplementary Information

Utilization of Ru(II)-complex immobilized ZnO hybrid in presence of Pt(II) co-catalyst for photocatalytic reduction of 4-nitrophenol under visible light

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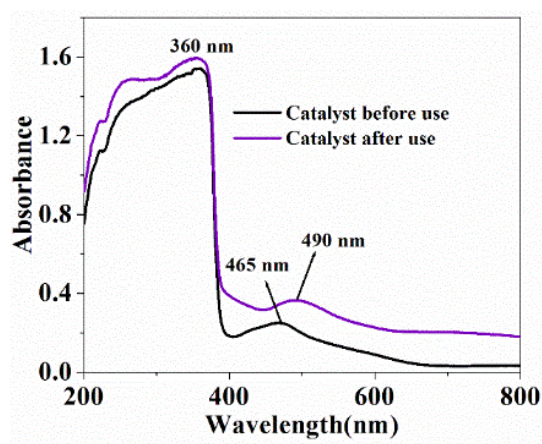


Figure S1: DRS spectra of catalyst before and after the photocatalysis

The DRS spectrum of the catalyst after reaction shows a red shift in absorbance value of Ru-dye immobilized on the ZnO surface from 465 nm to 490 nm which suggests the inclusion of Pt(II) on ZnO surface. It also indicates that the catalyst is reusable in visible light irradiation. The XPS spectrum of the catalyst after reaction also suggests the inclusion of Pt(II) on catalyst system.

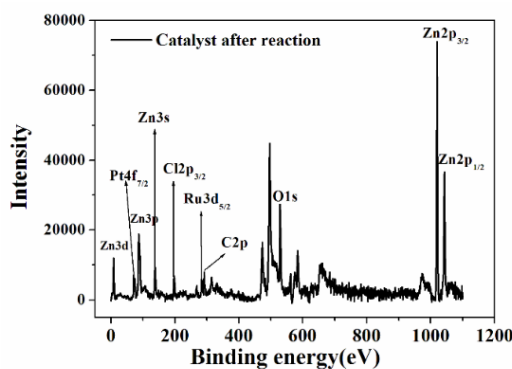


Figure S2: XPS spectrum of catalyst after photocatalysis

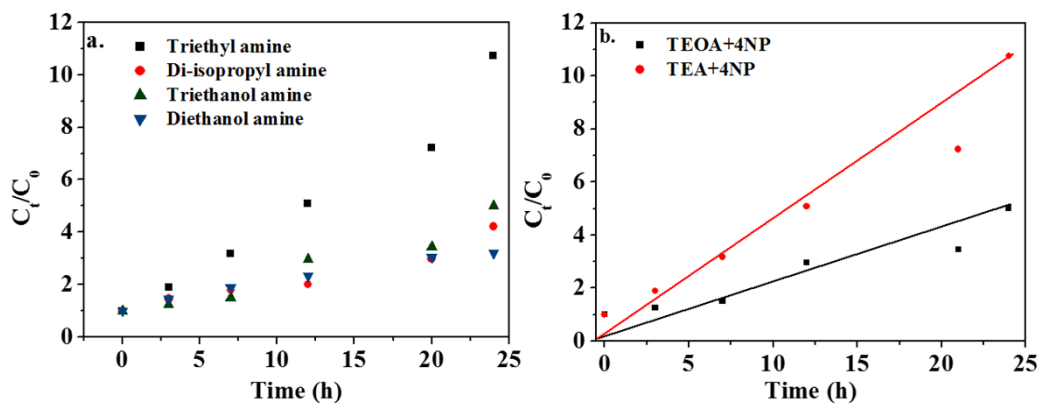


Figure S3: (a) Photoreduction reaction in presence of various sacrificial donor, (b) Kinetic plots of photoreduction of 4-nitrophenol in presence of TEA(commercial), TEOA

Preparation of Calibration Curve for the measurement of the concentration of 4-nitrophenol in the reaction mixture

In order to calculate the yield of the reduction reaction of the 4-nitrophenol in presence of transition metal salt as co-catalyst under the visible light irradiation (45W CFL lamp), the calibration curve of 4-nitrophenol in 0.25M TEOA solution was done. From the Stock solution of 4-nitrophenol of concentration 100 ppm, different concentration of 4-nitrophenol in 0.25M TEOA basic solution were prepared in acetonitrile. The absorbance value of these nitrophenol solution was recorded using UV-Visible spectrophotometer (Thermo Scientific Evolution 201 UV-Visible spectrophotometer) (Fig. S3 a). Based on this absorption curve, the calibration curve was plotted against absorbance ($\lambda_{\max} = 400 \text{ nm}$) versus concentration of 4-nitrophenol. It can be seen from the UV-Vis curve (fig. S3 a) that in case of 20 ppm 4-nitrophenol in 0.25M TEOA solution, 4-nitrophenol ($\lambda_{\max} = 317 \text{ nm}$) is not fully converted into the nitrophenolate ion ($\lambda_{\max} = 400 \text{ nm}$). Therefore the last point in the calibration plot corresponding to the 20 ppm value, is neglected to obtain a linear plot of $R=0.9999$.

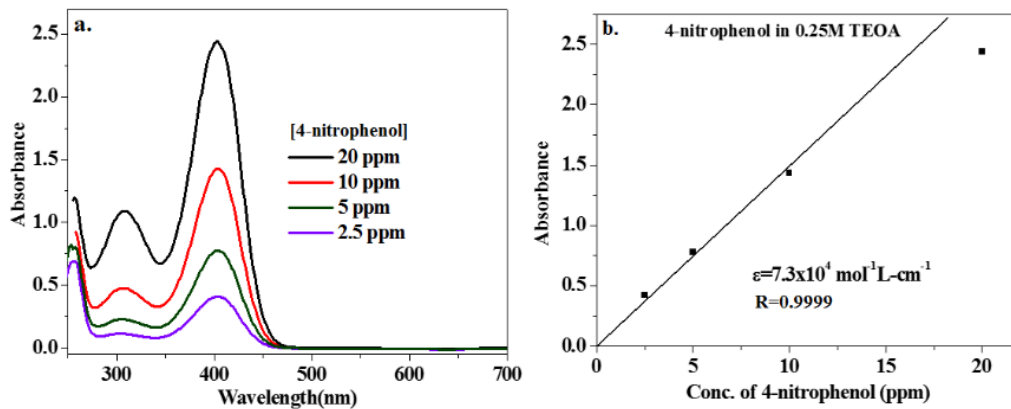


Figure S4: (a) Spectra of 4-nitrophenol in different concentration in 0.25M TEOA. (b). Calibration curve

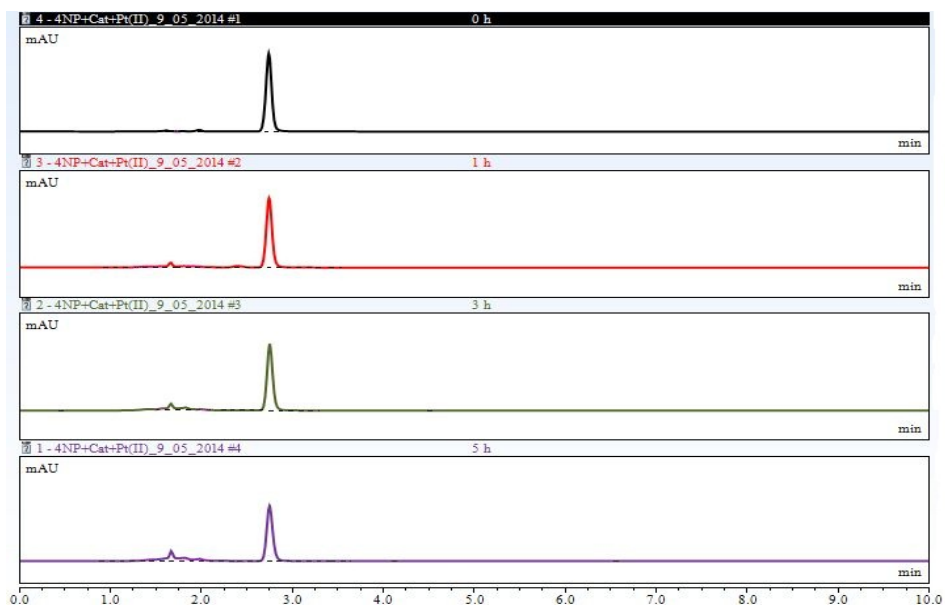


Figure S5: Kinetic study of the photoreduction reaction monitored by HPLC showing a new peak with increasing intensity with time along with a decrease in the intensity of the existing peak.