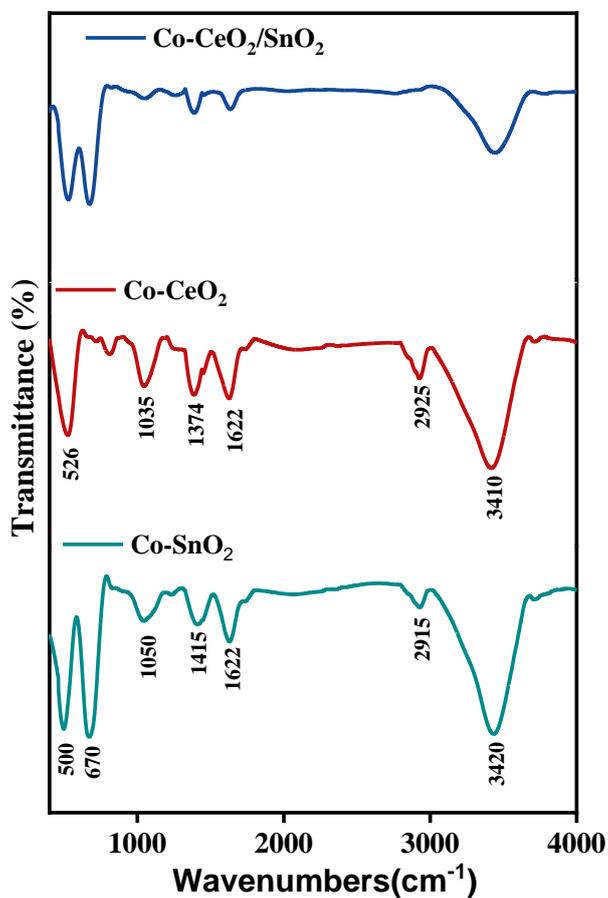
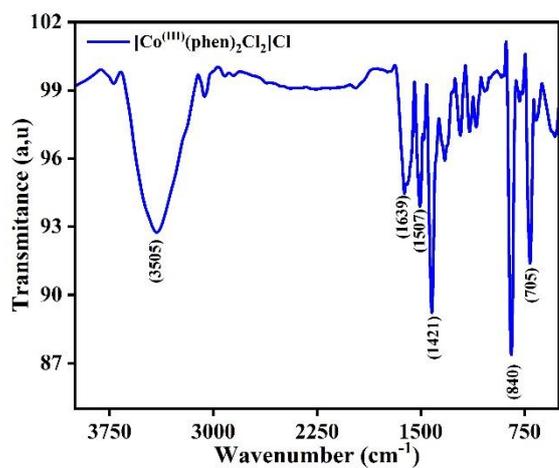


1 Synthesis of (Co³⁺/Co²⁺) incorporated CeO₂ composites

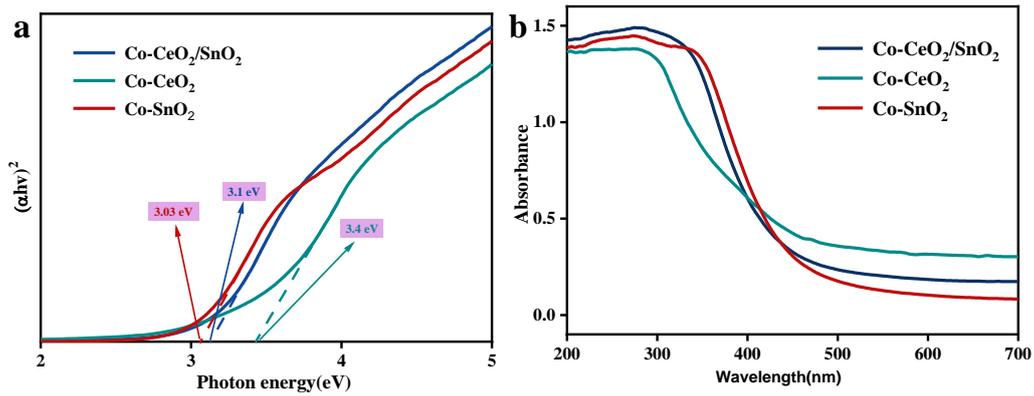
The Photo reactor, a quartz glass reactor, was used to disperse 4.7786×10^{-4} M of the *cis*-[Co(III)(Phen)₂Cl₂]Cl complex in 100 mL of plain water and distilled-H₂O/PrⁱOH (70/30% (v/v)) solvent medium separately. The ionic strength of the solution was maintained by adding 10 mL of sodium nitrate (1 M), 100 mg of CeO₂ catalyst, and magnetic stirring. The dispersion's wavelength was 254 nm when irradiated by a UV- lamp. The mixture was exposed to radiation for 20 minutes after being filtered and dried at room temperature. The samples obtained using plain water are referred and those using H₂O/PrⁱOH (70/30% (v/v)) are referred to as Table. 5.

2 Synthesis of (Co³⁺/Co²⁺) incorporated SnO₂ composites

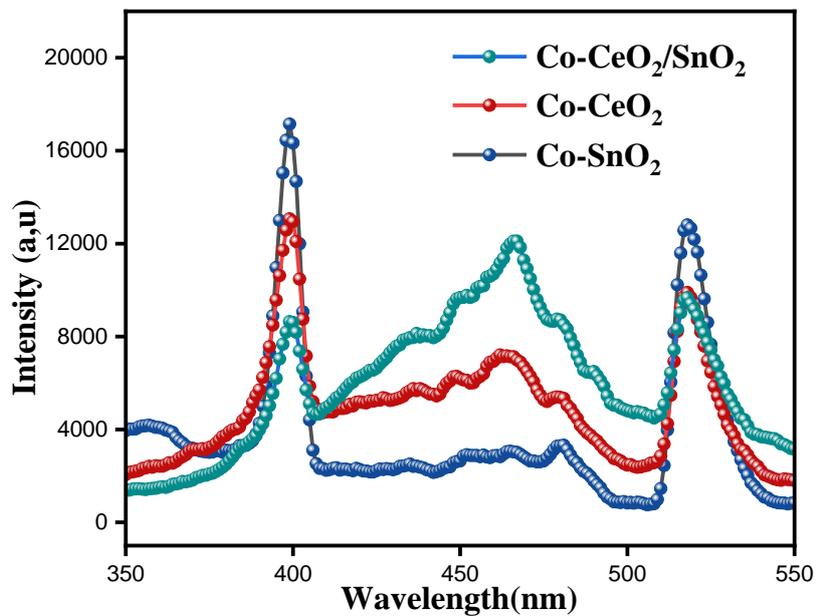
The Photo reactor, a quartz glass reactor, was used to disperse 4.7786×10^{-4} M of the *cis*-[Co(III)(Phen)₂Cl₂]Cl complex in 100 mL of plain water and distilled-H₂O/PrⁱOH (70/30% (v/v)) solvent medium separately. The ionic strength of the solution was maintained by adding 10 mL of sodium nitrate (1 M), 100 mg of SnO₂ catalyst, and magnetic stirring. The dispersion's wavelength was 254 nm when irradiated by a UV- lamp. The mixture was exposed to radiation for 20 minutes after being filtered and dried at room temperature. The samples obtained using plain water and those using H₂O/PrⁱOH (70/30% (v/v)) are referred to as Table. 5.



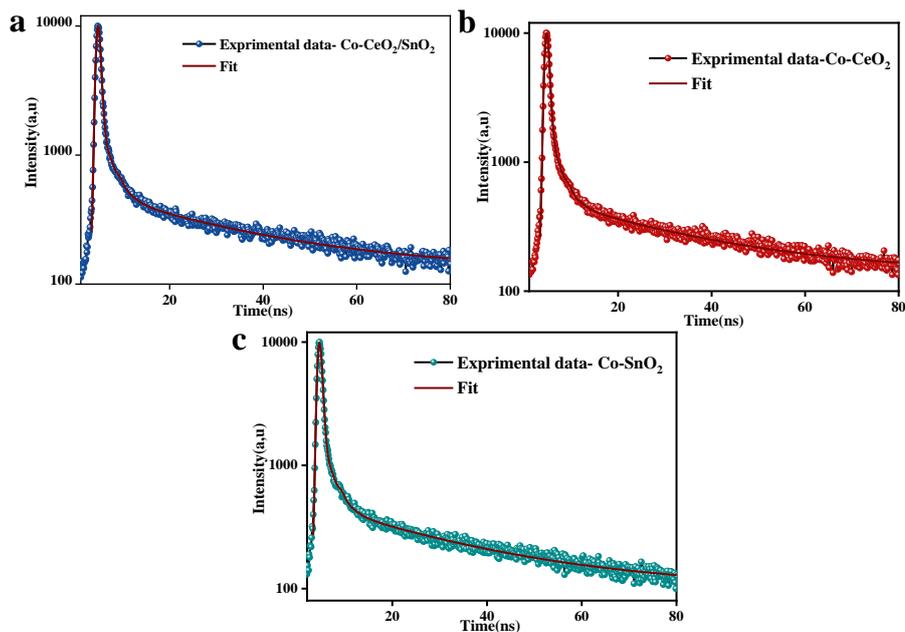
S.1 IR – spectrum (a) $\text{Co-CeO}_2/\text{SnO}_2$ nanocomposite, Co-CeO_2 and Co-SnO_2 nanospheres at room temperature and (b) $\text{cis-}[\text{Co}(\text{phen})_2\text{Cl}_2]\text{Cl}$ complex.



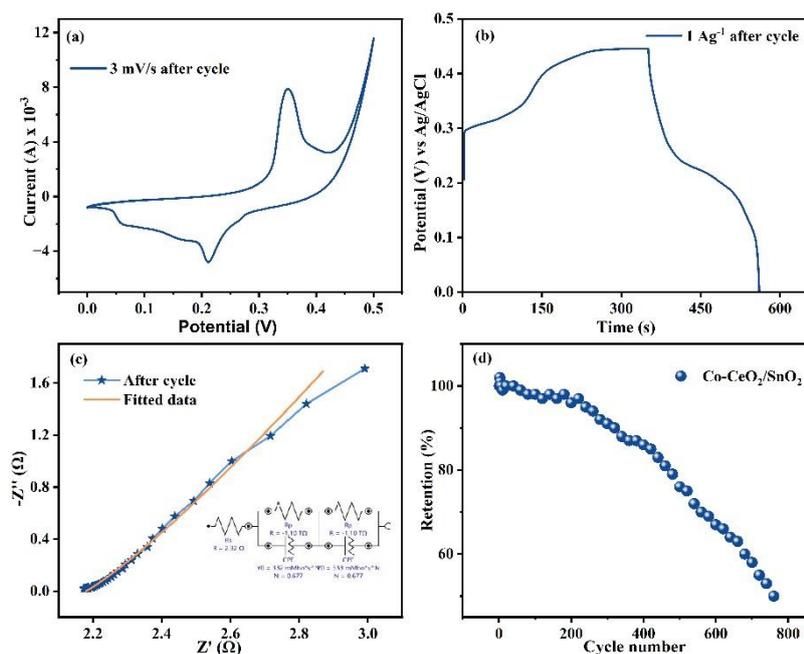
S.2 UV-visible absorption spectra and Tauc's plots ($(\alpha h\nu)^2$ vs energy (eV)) of Co-CeO₂/SnO₂ nanocomposite, Co-CeO₂ and Co-SnO₂ nanospheres at room temperature (Reflection standard: BaSO₄).



S.3 Steady-state emission spectra of Co-CeO₂/SnO₂ nanocomposite, Co-CeO₂ and Co-SnO₂ nanospheres at wavelength 295 nm at room temperature.



S.4 Photoluminescence spectra(lifetime) of Co-CeO₂/SnO₂ nanocomposite, Co-CeO₂ and Co-SnO₂ nanospheres at excitation wavelength 295 nm at room temperature. The discrete symbols are the experimental data and the continuous lines correspond to the tri-exponential fitted lines of the experimental data.



S. 5 (a) After cycle CV curve of Co-CeO₂/SnO₂ at scan rate: 3 mV/sec, (b) GCD contrast curve at the current density of 1 Ag⁻¹, (c) ESI contrast curve of Co-CeO₂/SnO₂, (d) GCD contrast retention (%) at 3 Ag⁻¹.