

Electronic Supplementary Information (ESI)

Monoclinic CuO Nanoflowers on Resin support: Recyclable Catalyst to obtain Perylene compound

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Characterisation of the material:

All absorption spectra were recorded in a Shimadzu UV-160 spectrophotometer (Kyoto, Japan) taking the solutions in a 1 cm quartz cuvette. FTIR spectral characteristics of the samples were collected in reflectance mode with Nexus 870 Thermo-Nicolet instrument coupled with a Thermo- Nicolet Continuum FTIR microscope. One drop of the test solution was placed on a KBr pellet and was dried under vacuum for 6 h before analysis. Raman spectra of CuO nanoflower was obtained with a Renishaw Raman Microscope, equipped with a He–Ne laser excitation source emitting at a wavelength of 633 nm, and a Peltier cooled (-70 °C) charge coupled device (CCD) camera. A Leica microscope with 20×objective lens was used. The holographic grating with 1800 grooves/mm and the 1 cm⁻¹ slit enabled the spectral resolution. Laser power at the sample was 12 mW and the data acquisition time was 30 sec. The phase and purity of the product was determined by X-ray powder diffraction (XRD) using an X-ray diffractometer with Cu K α radiation (λ = 1.5418 Å). Scans were collected on dry nanoproducts in the range of 20-90°. Measurements were performed at room temperature. Finally, the Brunauer- Emmett-Teller (BET) surface area was measured with an accelerated surface area and porosimetry system (ASAP 2020 V3.01 G) from N₂ adsorption-desorption isotherms. XPS analysis was performed on an ESCA LAB MK II using Mg as the exciting source. The samples were prepared by placing one drop of the prepared nanoparticle suspension onto a clean glass slide and then allowing them to dry in air. The particle size, shape, and morphology of nanoparticles were observed with a field emission scanning electron microscope, FESEM (Supra 40, Carl ZEISS Pvt. Ltd.). TEM, HRTEM and EDAX measurements of the metal sols were performed in a Hitachi H-9000 NAR instrument on samples prepared by placing a drop of fresh metal oxide sols on copper grids precoated with carbon films, followed by solvent evaporation under vacuum.

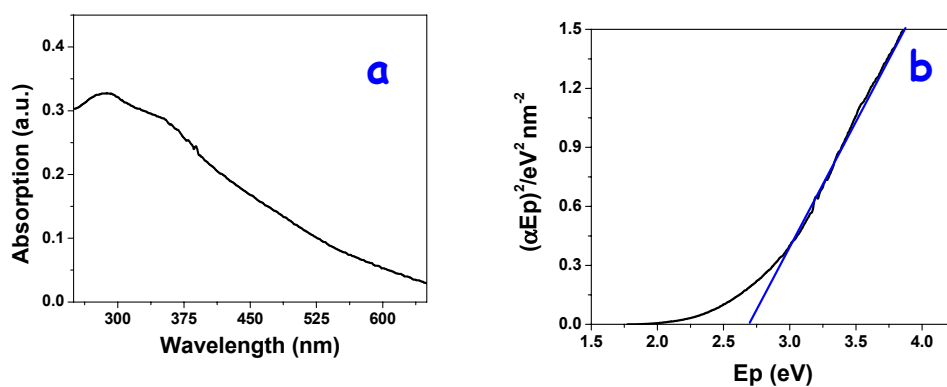


Fig. S1: a) UV-Vis absorption spectra of CuO nanoflower stripped off from the resin matrix in ethanol b) Calculated band gap value of the prepared nanoflower from the plot of $(\alpha E_p)^2$ Vs E_p .

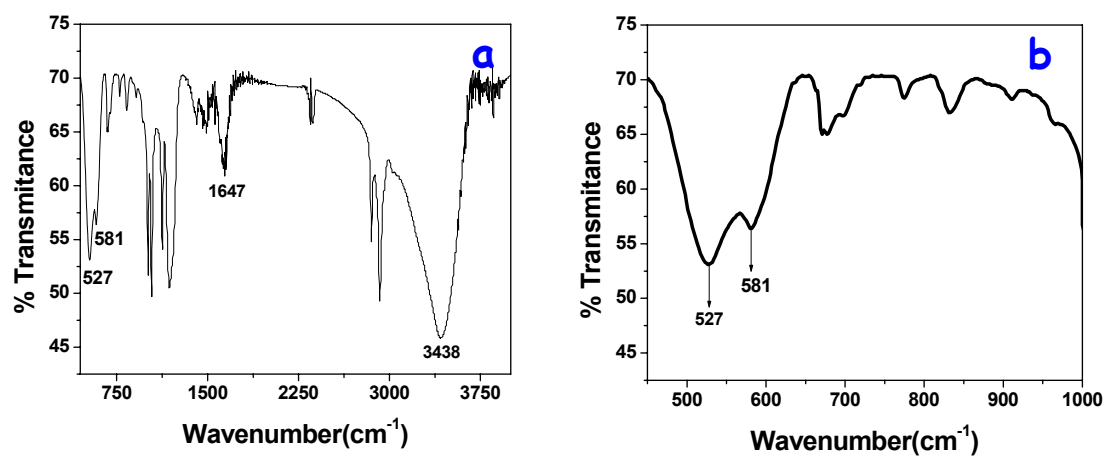


Fig. S2: FT-IR spectra of CuO nanoflower a) full scale scan data 500 to 4000 cm^{-1}
b).Scan data from 500-1000 cm^{-1} .

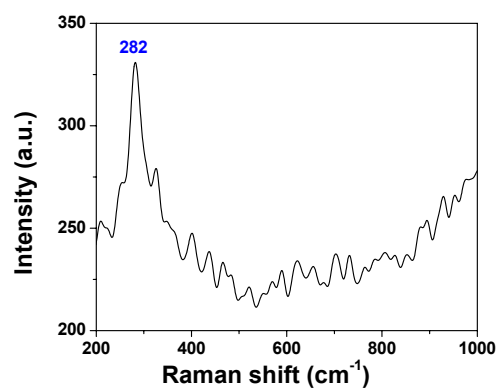


Fig. S3: Raman spectrum of CuO nanoflower.

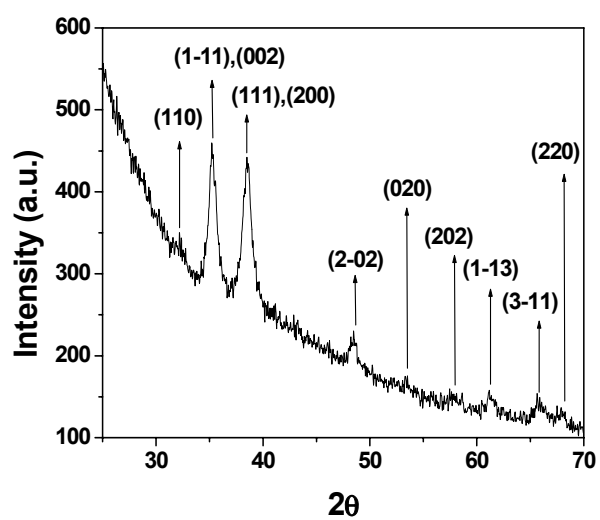


Fig. S4: XRD spectrum of CuO nanoflower prepared onto the polystyrene moiety.

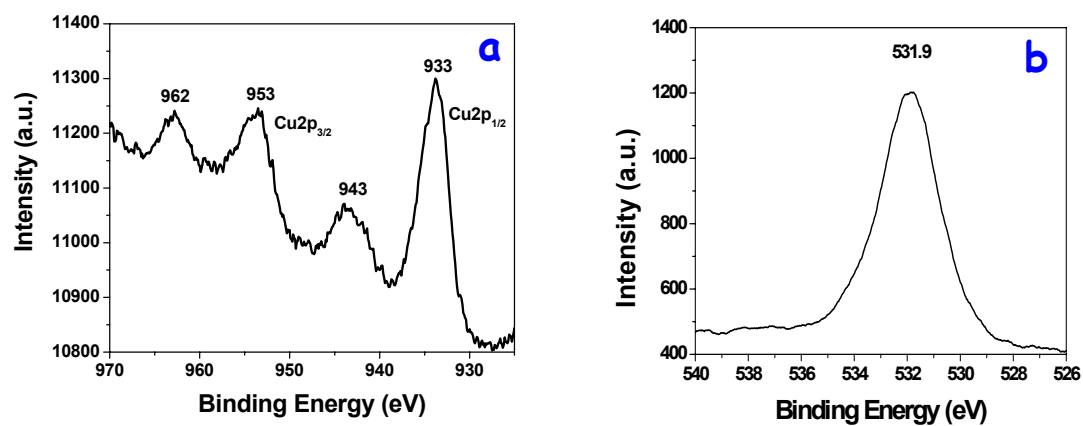


Fig. S5: XPS spectra of CuO nanoflower a) Cu 2p, b) O1s.

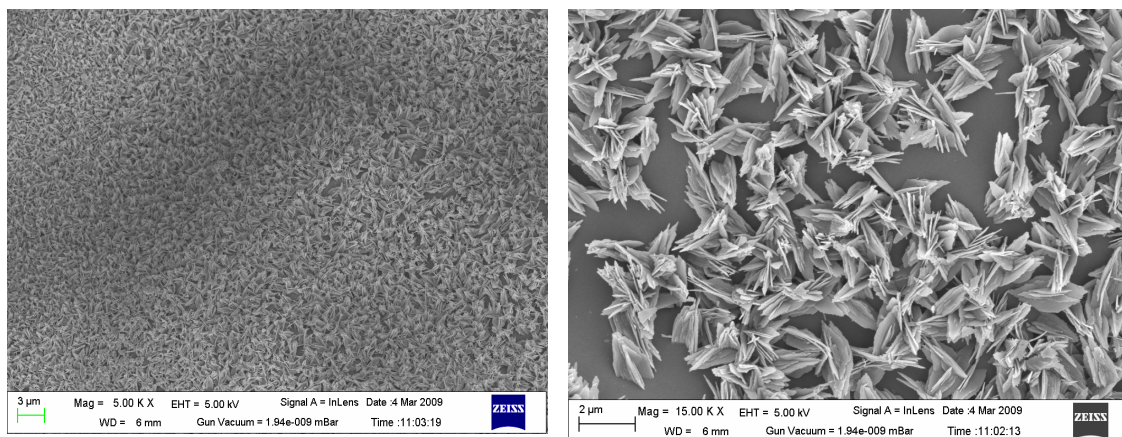


Fig. S6: FESEM images of flat petals of CuO produced when polystyrene moiety immobilized Cu(II) 1,10 phen is heated on water bath at ~80 °C in alkaline condition (pH~12.0) in absence of CTAB.

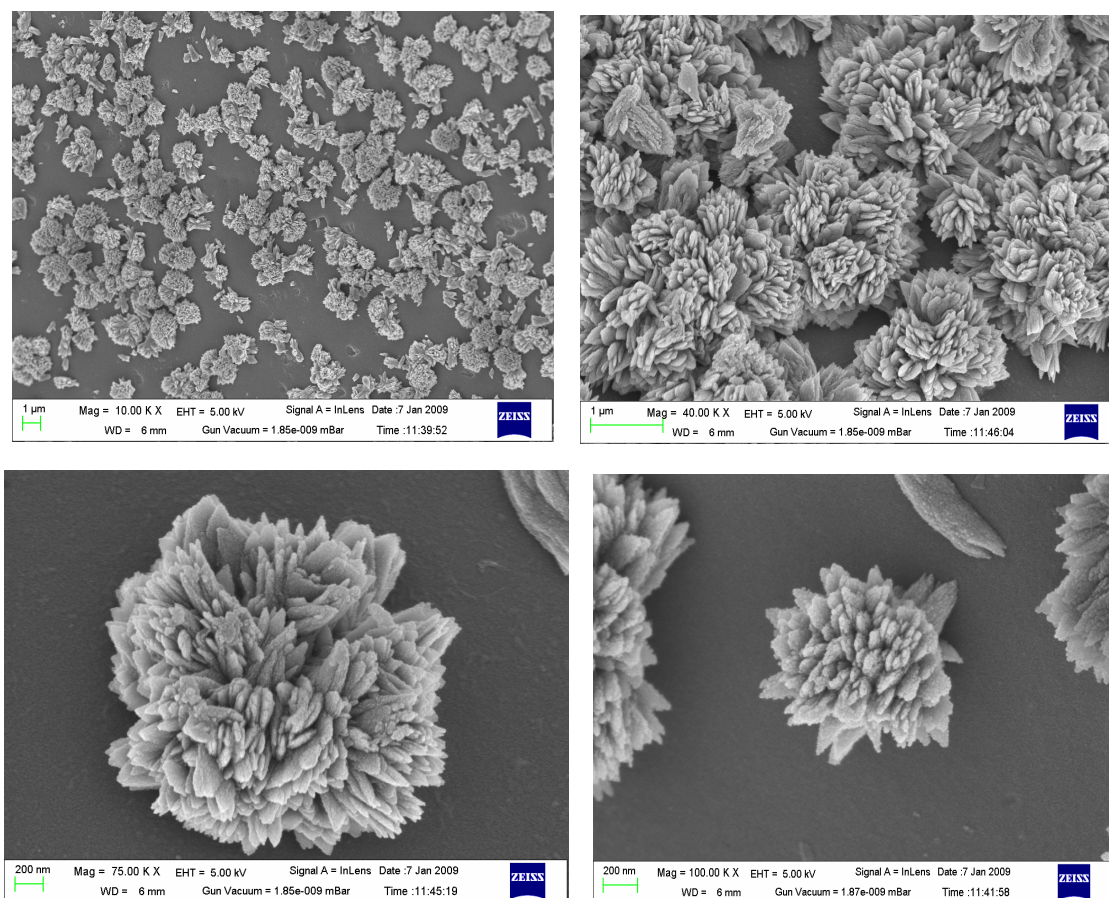


Fig. S7: FESEM images of CuO nanoflower produced when Cu^{2+} immobilized polystyrene moiety is heated on water bath at $\sim 80^\circ\text{C}$ in alkaline condition (pH $\sim$ 12.0) using CTAB.

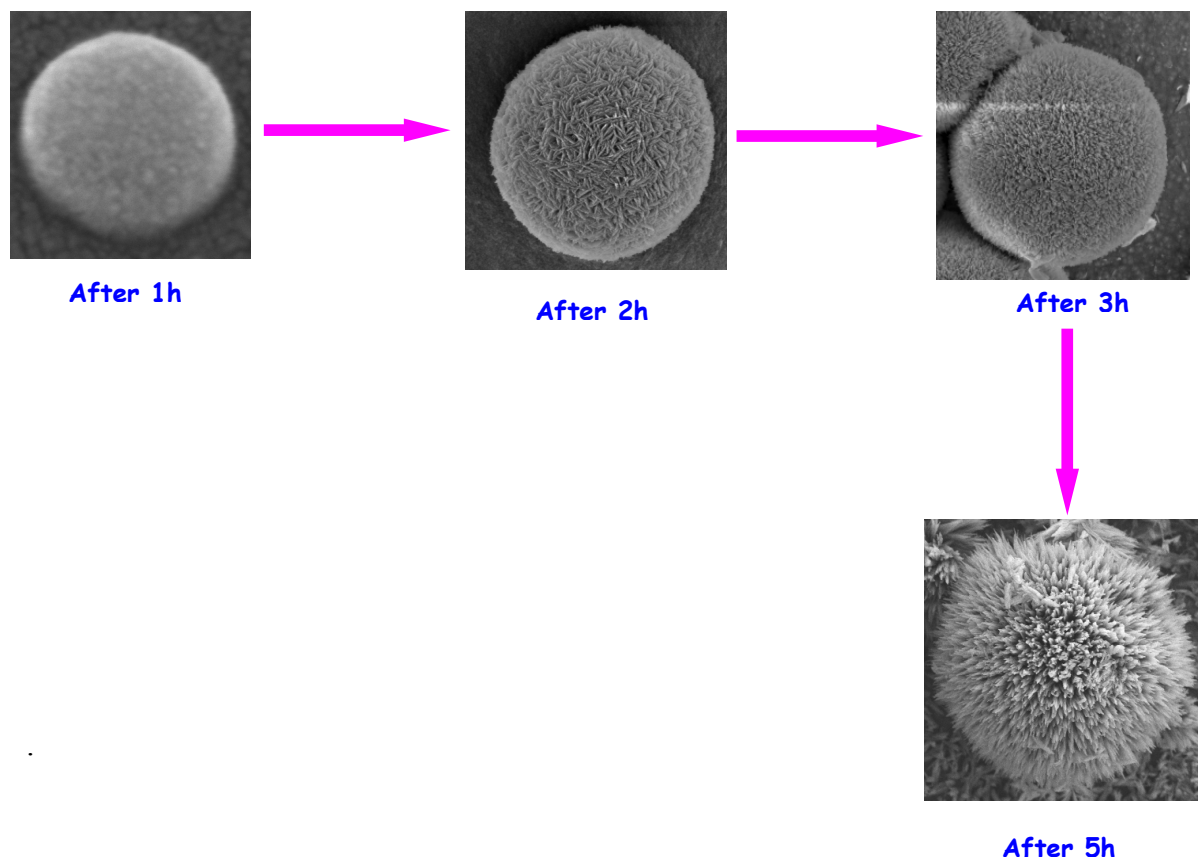


Fig. S8: Schematic representation of the growth process of CuO nanoflower.

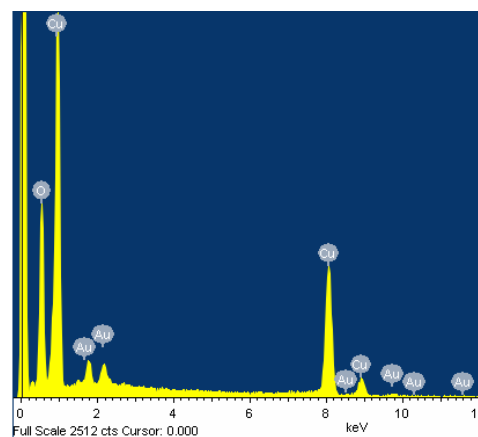


Fig. S9: EDS spectrum of CuO nanoflower.

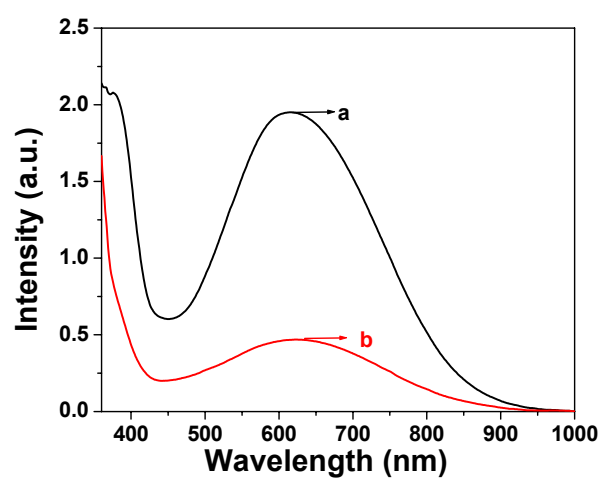


Fig. S10: Comparative UV-visible spectra of the reaction mixtures recorded after 45mins of the catalytic reaction (a) with resin bound CuO nanoflower, (b) with bulk CuO.

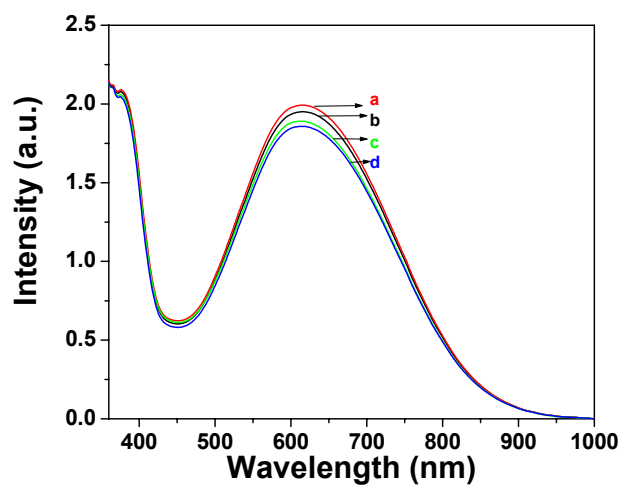


Fig. S11: UV-visible spectra of the reaction mixture for reusability study.

Condition: spectra recorded after 45mins of the each set of catalytic cycle (a) with original catalyst, (b) with reused catalyst (1st time), (c) with reused catalyst (2nd time), (d) with reused catalyst (3rd time)

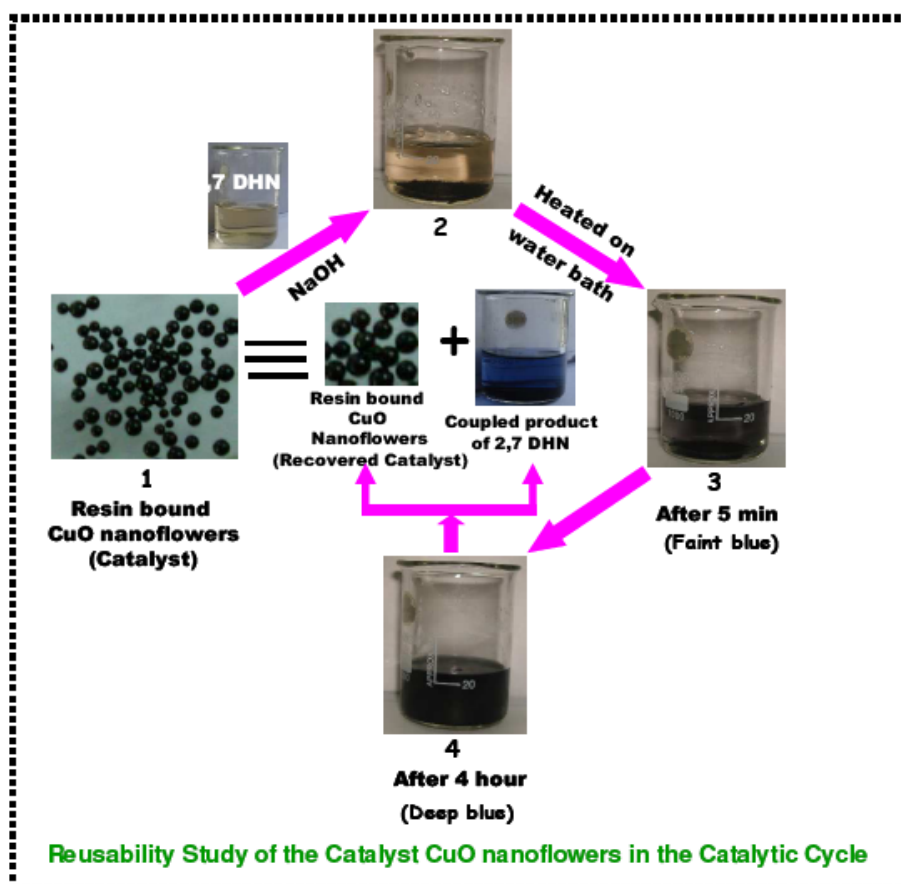


Fig. S12: Schematic representation of the reusability study of CuO nanoflower catalyst.

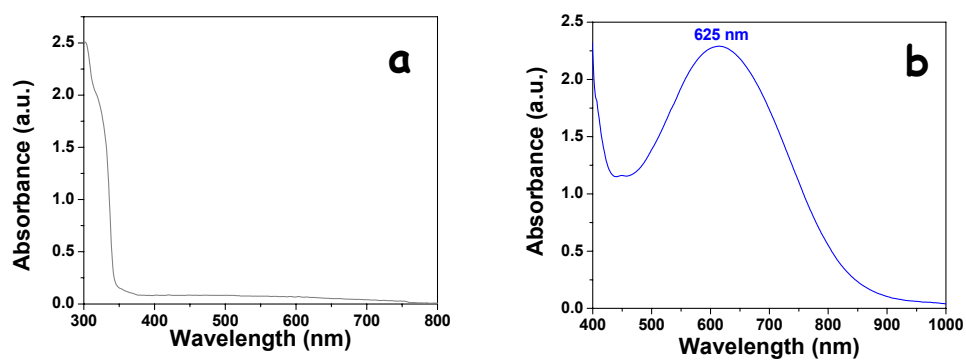


Fig. S13: UV absorption spectra of a) 2,7 DHN, b) 1,8 coupled product (perylene compound), of 2,7 DHN.

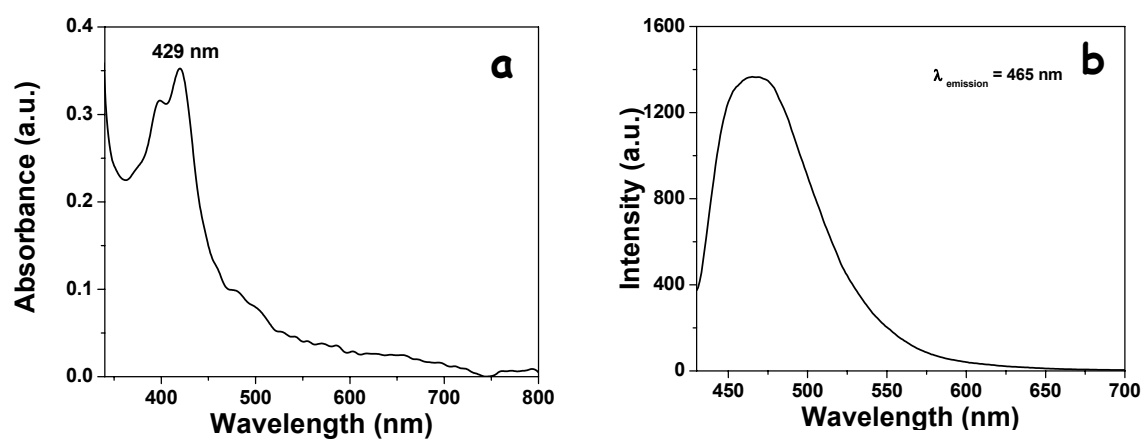


Fig. S14: a) UV absorption, b) Fluorescence spectra of the acetylated perylene compound.