Catalytic effect of nano copper ferrite on the synthesis of 6-(anthracen-9-yl)-4-(benzofuran-2-yl)pyrimidin-2-(1*H*)-one

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SUPPLEMENTARY DATA

Characterization of $CuFe_2O_4$ nanoparticles

S1. XRD

The diffraction peaks subtended at 32.36˚, 35.40˚, 38.61˚, 48.65˚, 53.94˚, 58.18˚, 61.45˚ and 66.15˚ correspond to the lattice planes (220), (311), (222), (400), (422), (511), (440) and (400) respectively. The position and relative intensity of all diffraction peaks for this catalyst can be readily indexed to $CuFe_2O_4$ (JCPDS No: 34-0425) [1-4]. The Scherrer formula (Equation 1) was used for the calculation of the average crystallite size of $CuFe_2O_4$. The average crystallite size of $CuFe_2O_4$ is found to be 27 nm.

$$D = K \cdot \lambda / \beta \cdot \cos\theta \qquad (1)$$

where D is the crystalline size, λ is wavelength X-ray used, K is the shape factor, β is the full width half maximum high of peak and θ is the Bragg angle.

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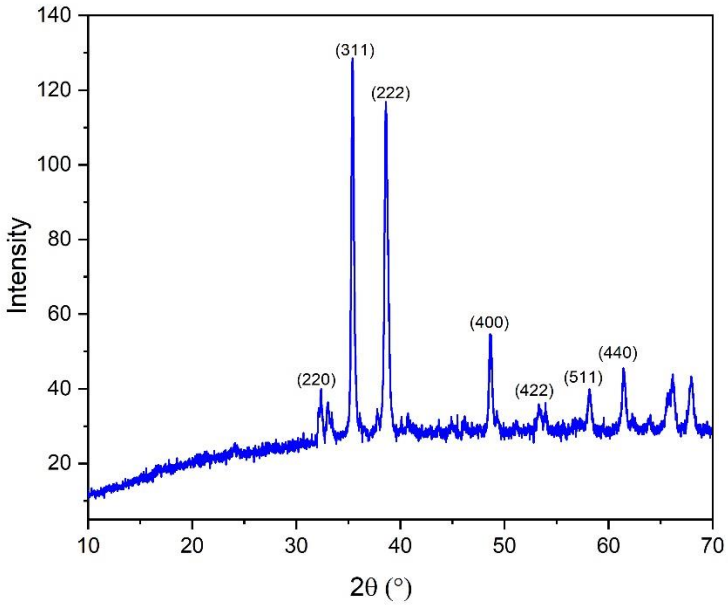

Figure S1. XRD pattern of $CuFe_2O_4$.

S2. FT-IR spectroscopy

The FTIR spectra recorded for $CuFe_2O_4$ nanoparticles in the range between 4000 and 400 cm^{-1} are shown in Fig. 2. The spectra give information about the chemical, molecular structure and impurities present in the synthesized ferrites. Absorption bands appear one at 540 cm^{-1}, which is attributed to stretching vibration of octahedral group Fe–O stretching [5,6] and another band at 484 cm^{-1} are attributed to the tetrahedral group Cu–O stretching bands [7]. These two bands confirm the formation of spinel structure. The other peaks at 3425 and 1448 cm^{-1} corresponds to the adsorbed H_2O, NO_3^- [8] onto the surface of the spinel ferrites respectively. The adsorption of H_2O is typical of nanomaterials and the presence of NO_3^- might be due to the nature of precursors used.

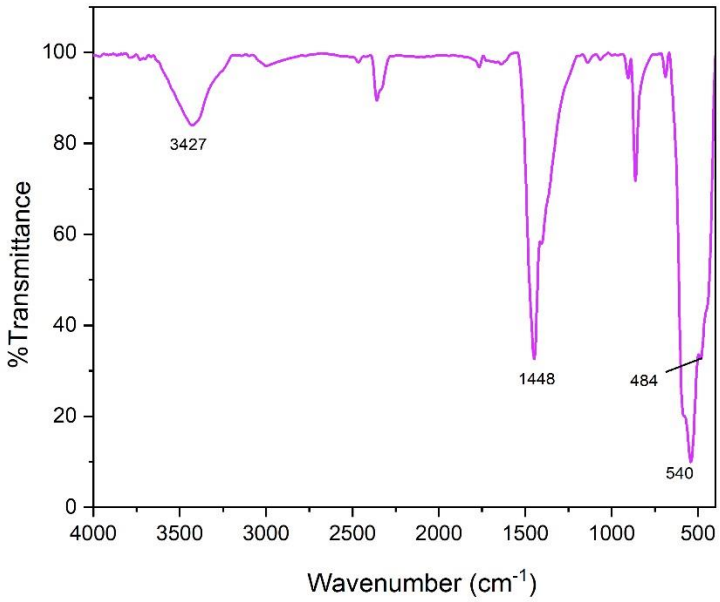

Figure S2. FT-IR spectrum of $CuFe_2O_4$

S3. SEM-EDX and ECM Analysis

The SEM images for the $CuFe_2O_4$ sample with different magnifications are displayed in Figure 3a-d. Through the micrographs of the copper ferrite samples, heat-treated at 450 °C, agglomerates composed of several almost spherical particles in the form of flakes were observed. The presence of elements Cu, Fe and O in the catalyst was confirmed by EDX recorded from the selection area (Fig. 3e). Fig. 3e inset shows an elemental colour mapping of Cu, Fe and O elements in the $CuFe_2O_4$ composites.

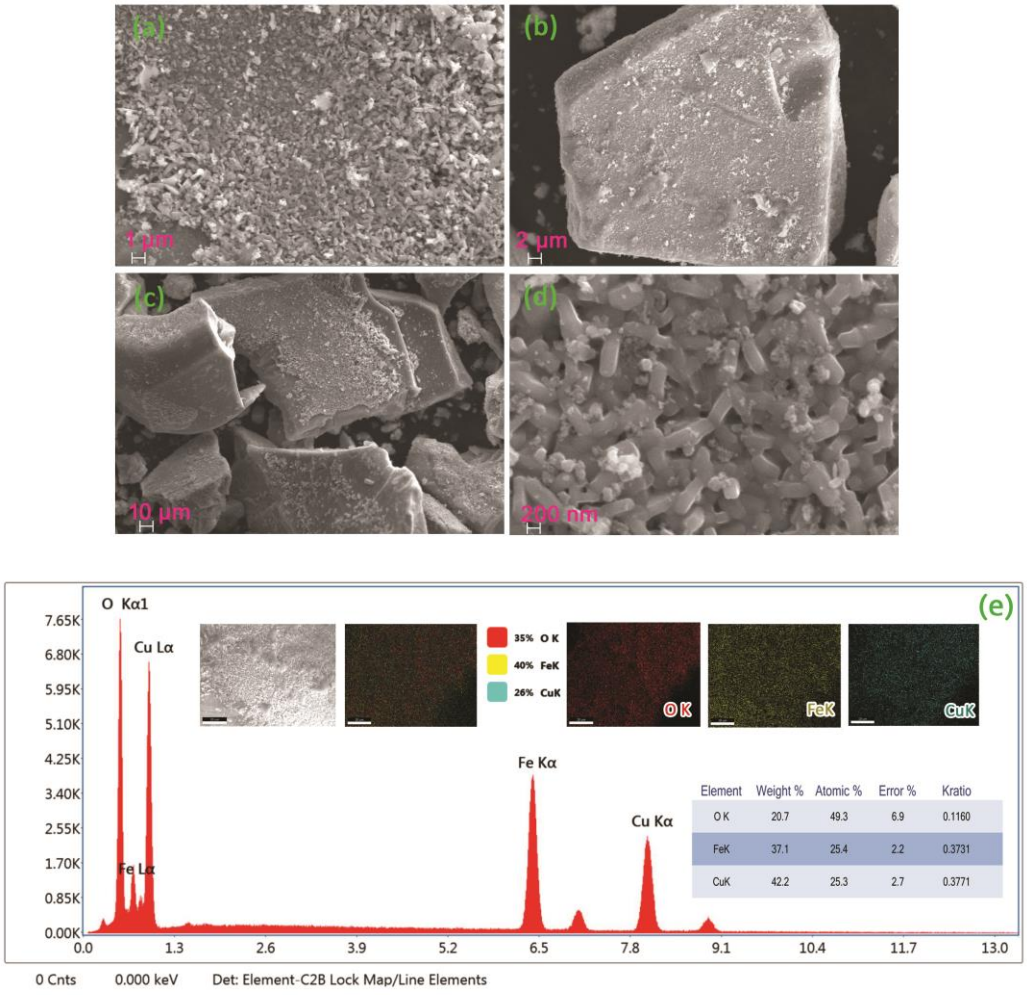

Figure S3. SEM images of $CuFe_2O_4$: a) 1 µm; b) 2 µm; c) 10 µm; d) 200 nm; e) EDX and ECM of $CuFe_2O_4$.

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