

Supplementary files

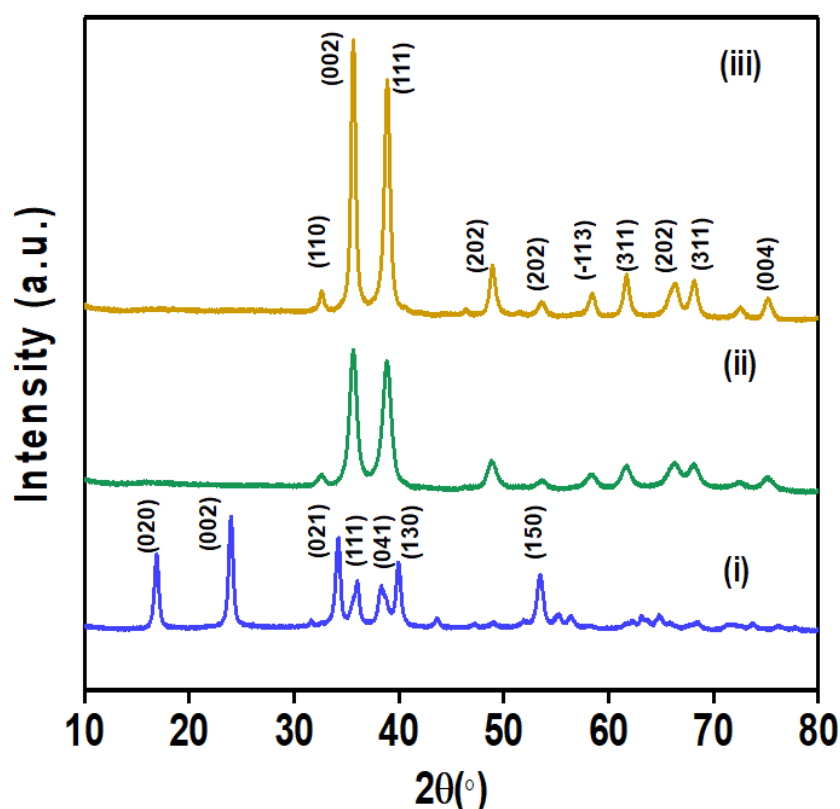


Figure S1: XRD pattern for (i) Cu(OH)₂ nanofiller, (ii) CuO-200 nanofiller and (iii) CuO-500 nanofiller.

The effect of calcination temperature on the structure of the samples is studied via XRD diffractograms as shown in Figure 1 and Figure S1. Cu(OH)₂ shows a series of sharp peaks which indicates its crystalline structure at 16.8° , 23.9° , 34.2° , 35.9° , 38.3° , 40.5° , and 53.3° . These peaks can be indexed to (020), (021), (002), (111), (041), (130) and (150) planes of orthorhombic phase Cu(OH)₂ (JCPDS card No. 13-0420), respectively [22]. After calcination, different patterns were observed for CuO-200, CuO 350 and CuO-500 which signifies that Cu(OH)₂ was successfully transformed into the CuO. The peaks of CuO are located at 32.6° , 35.6° , 38.8° , 48.8° , 58.3° , 61.6° , 66.3° , 68.1° , 72.4° , and 75.1° in 2θ , corresponding to (110), (002), (111), (202), (202), (-113), (311), (202), (311) and (004) planes of monoclinic CuO (JCPDS No. 48-1548), respectively [23].

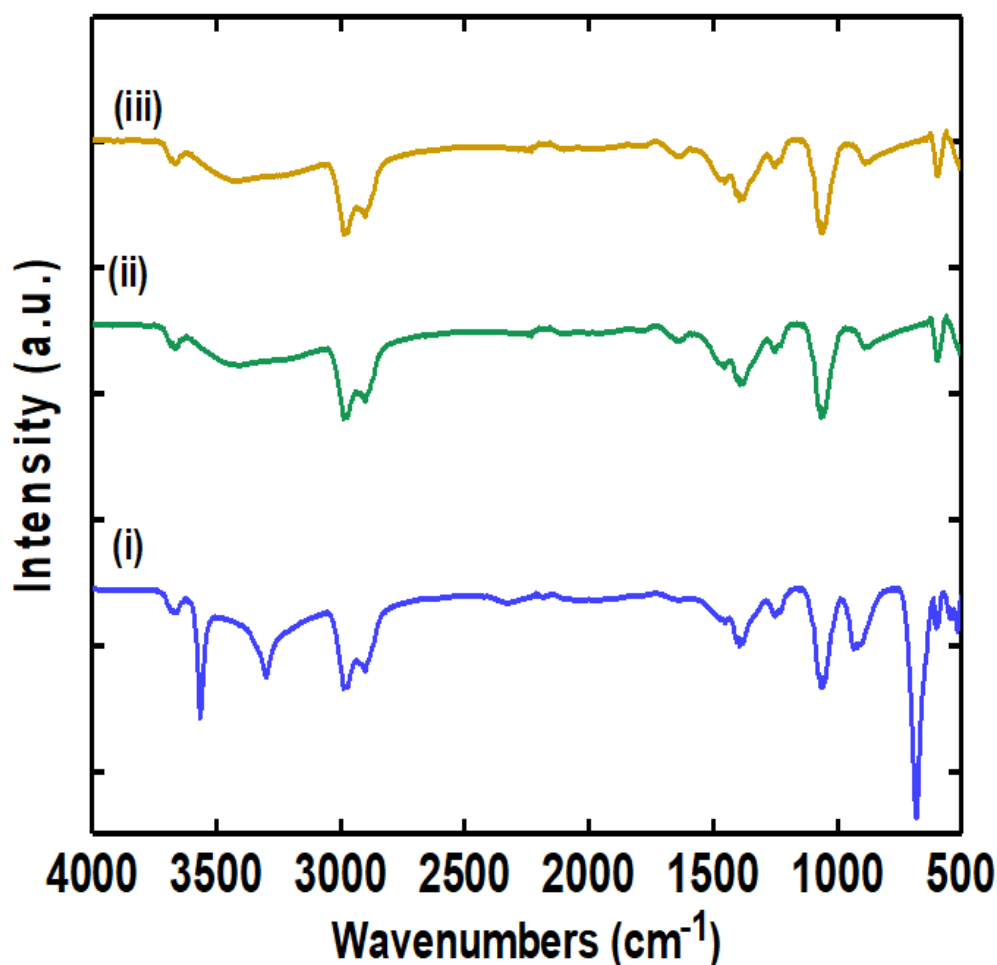


Figure S2: FTIR spectra for (i) Cu(OH)_2 nanofiller, (ii) CuO-200 nanofiller and (iii) CuO-500 nanofiller

Figure S2(i) shows that there are the appearance of stretching modes of O-H groups in Cu(OH)_2 at the peaks of 3568 cm^{-1} and 3305 cm^{-1} . The bands at 1380 and 1060 cm^{-1} indicate the bending mode of the absorbed water in as-prepared of Cu(OH)_2 powder [27]. While, at 933 cm^{-1} attributes to the C-O stretching vibration of metal cation, Cu^{2+} in Cu(OH)_2 .

Figure S2 (ii) and (iii) shows that the bands at 3440 and 1628 cm^{-1} for CuO-200 and CuO-500 correspond to the O-H group of water. While the absorption bands observed at 594 cm^{-1} is referring to Cu-O stretching modes [28]. Thus, the FTIR results confirm the formation of CuO at all calcination temperatures.

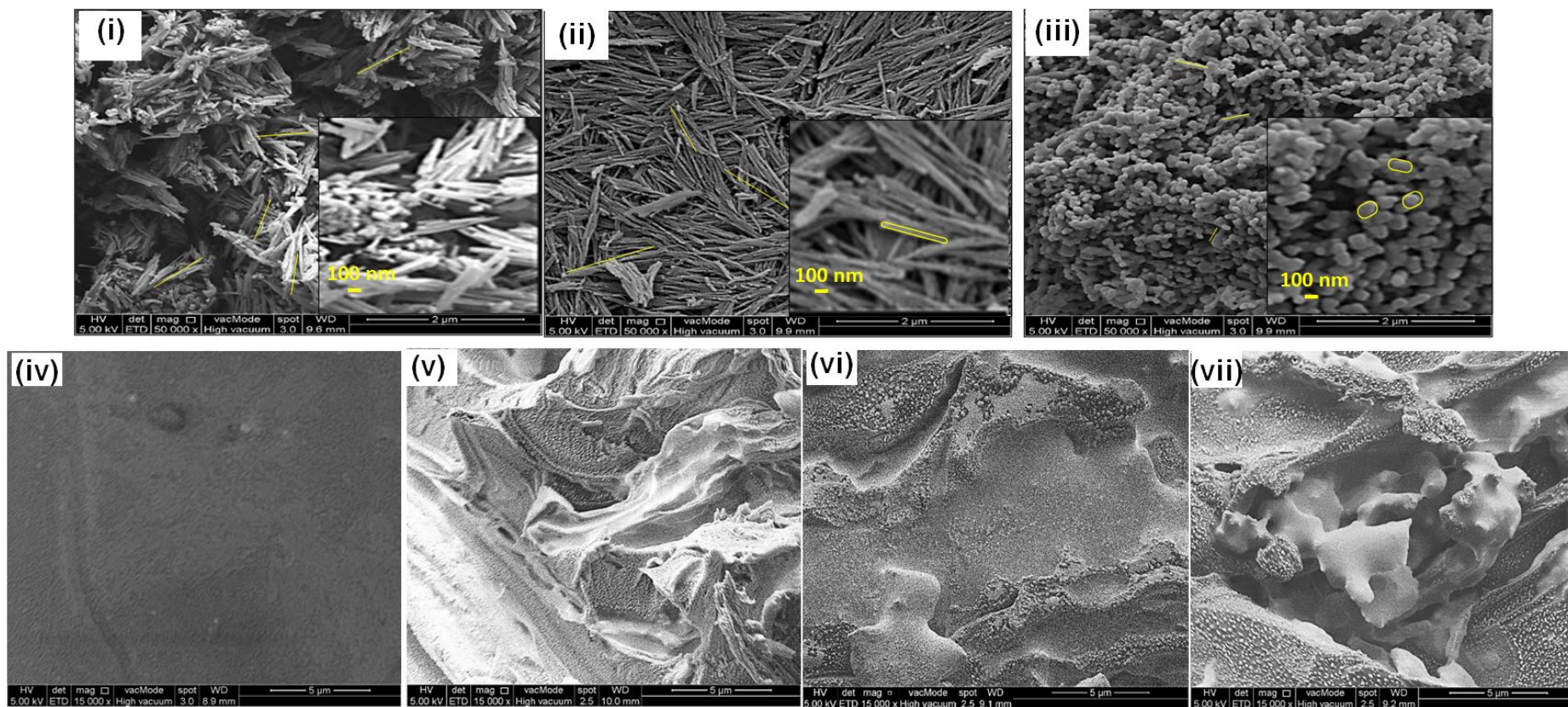


Figure S3: FESEM micrographs for (i) $\text{Cu}(\text{OH})_2$ nanofiller, (ii) CuO -200 nanofiller, (iii) CuO -500 nanofiller, (iv) Pure $\text{P}(\text{VB-co-VA-co-VAc})$, (v) $\text{TCu}(\text{OH})_2$, (vi) TCuO -200 and (vii) TCuO -500.

Table S1: Size and shape of Cu(OH) and CuO nanofiller at different calcination temperature.

Nanofiller	Size of nanofiller	Shape of naofiller
Cu(OH) ₂	Average length: 0.75 µm, diameter: 45 nm	nanorod
CuO-200	Average length: 1.12 µm, diameter: 45-50 nm	nanorod
CuO-350	Range of length: 1.58 consist of small nanorods (average length: 227 nm, diameter:91 nm)	Interconnected chain of small rod
CuO-500	diameter: 182 nm	sphere

