Supplementary information

Mechanochemical synthesis of Zn-bionanohybrids: Size-effect on the nanoscale to improve their enzyme-like activity

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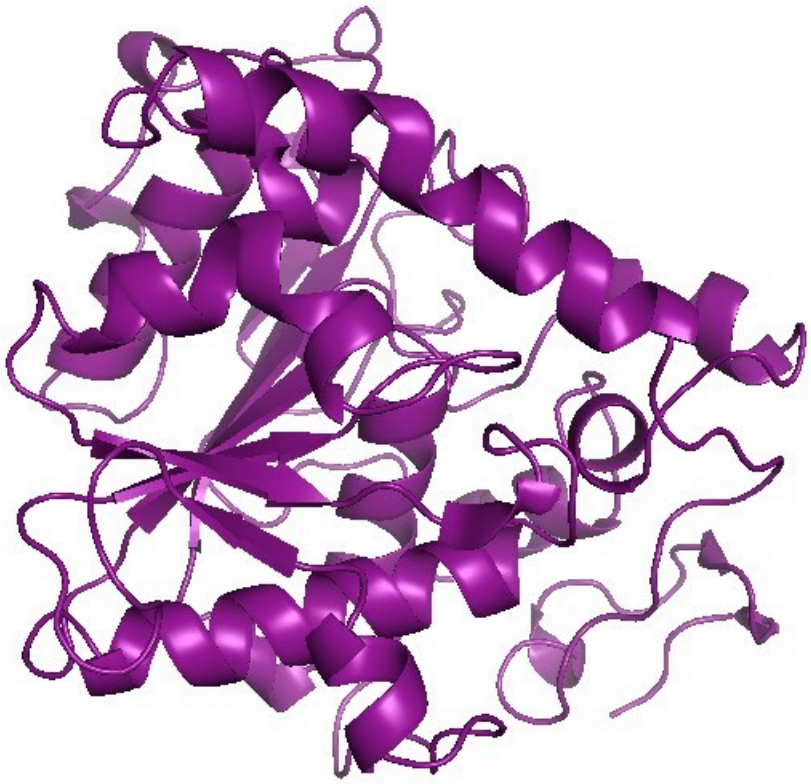


Fig. S1. Crystal structure cartoon of CALB. The protein structure was obtained from the Protein Data Bank (pdb code: 1TCA) and the picture was created using Pymol.

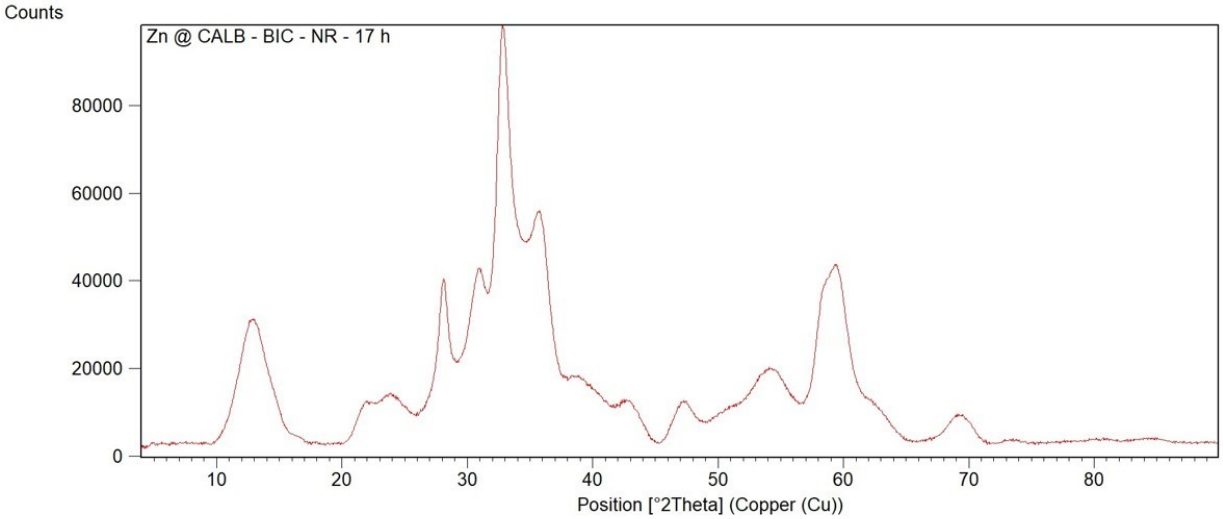


Fig. S2. XDR pattern of **Aq-Zn-BIC**.

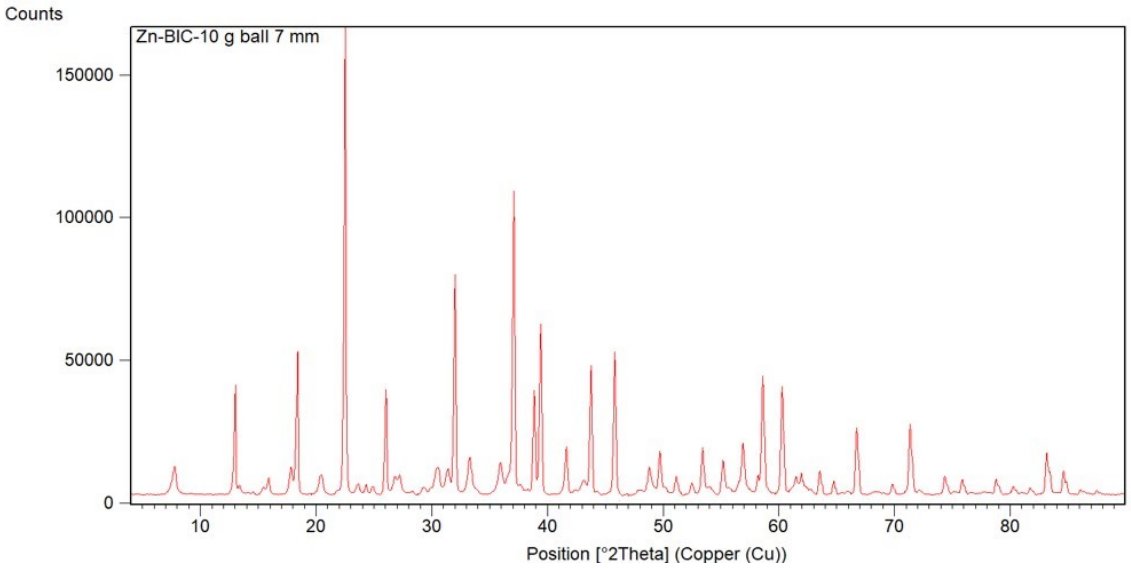


Fig. S3. XDR pattern of **M7-Zn-BIC**.

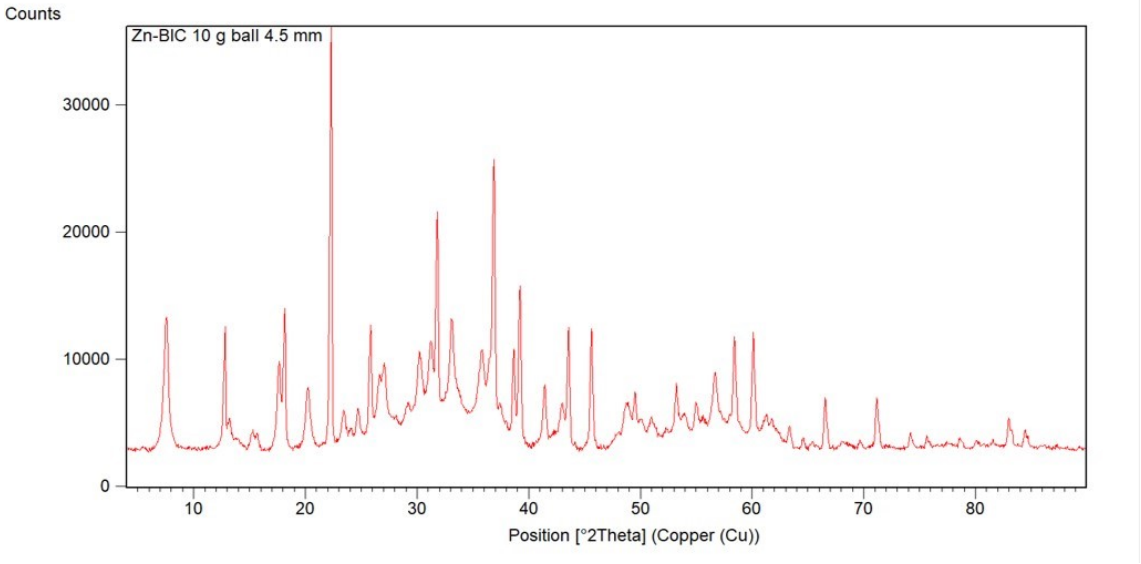


Fig. S4. XDR pattern of **M4.5-Zn-BIC**.

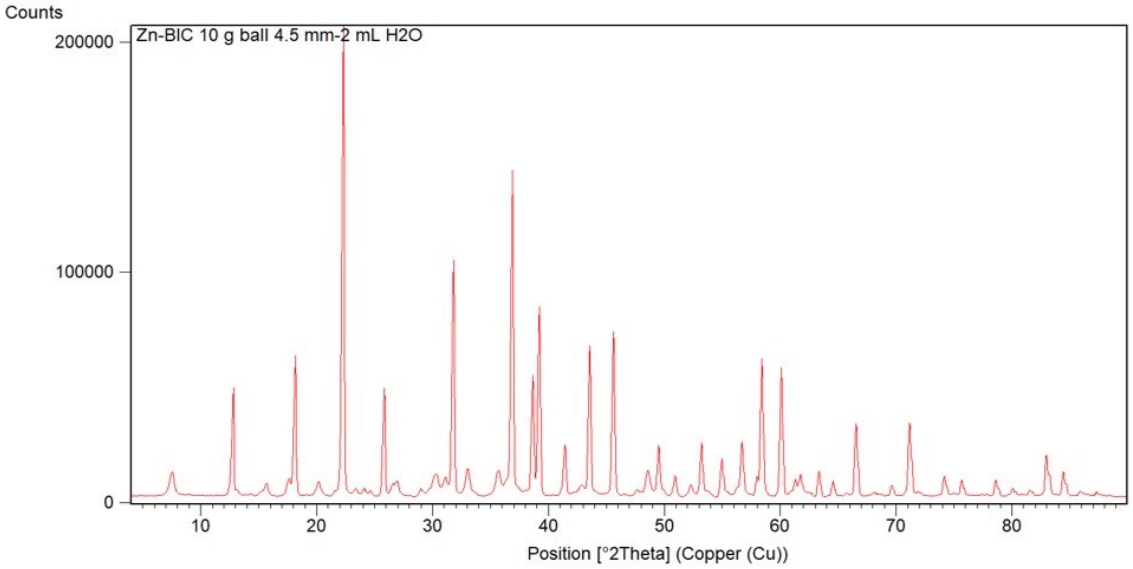


Fig. S5. XDR pattern of **M4.5-Zn-BIC-2H_2O**.

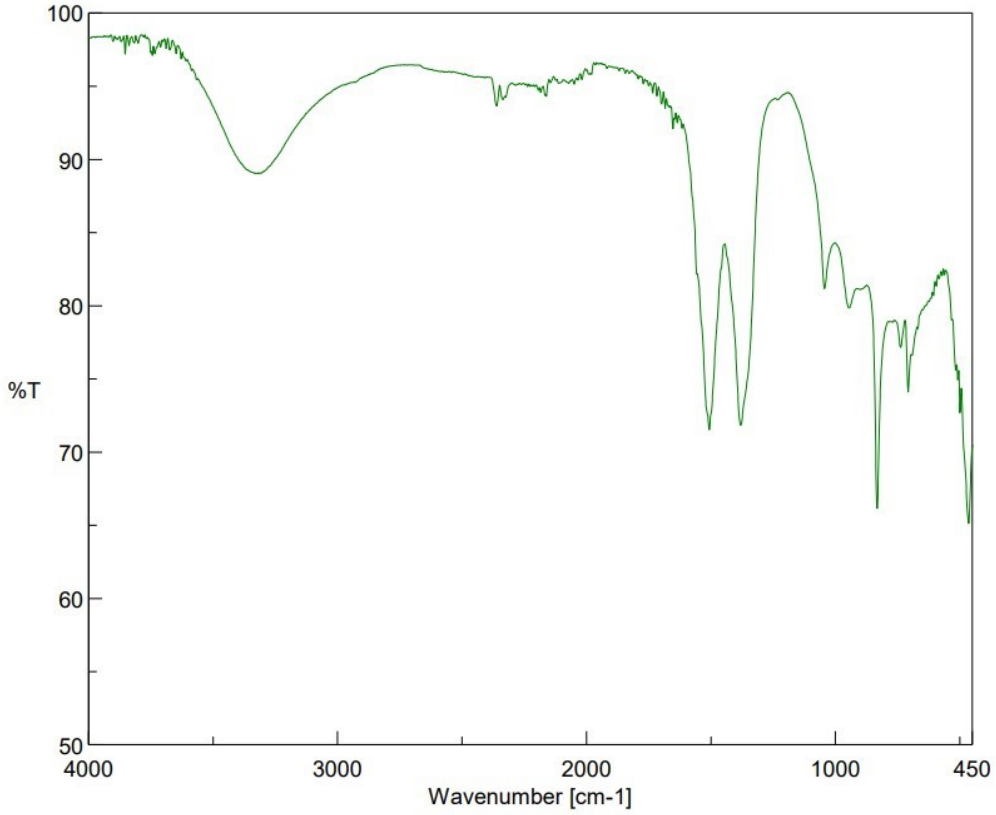


Fig. S6. FT-IR spectra of **Aq-Zn-BIC**.

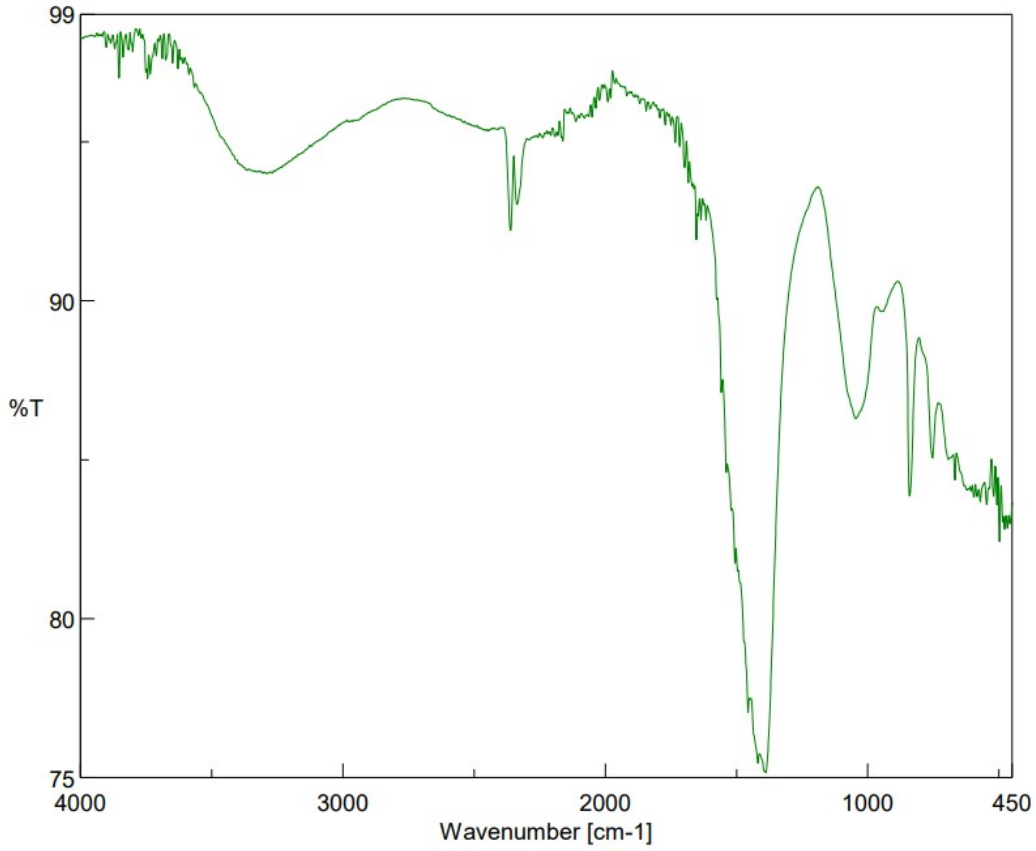


Fig. S7. FT-IR spectra of **M7-Zn-BIC**.

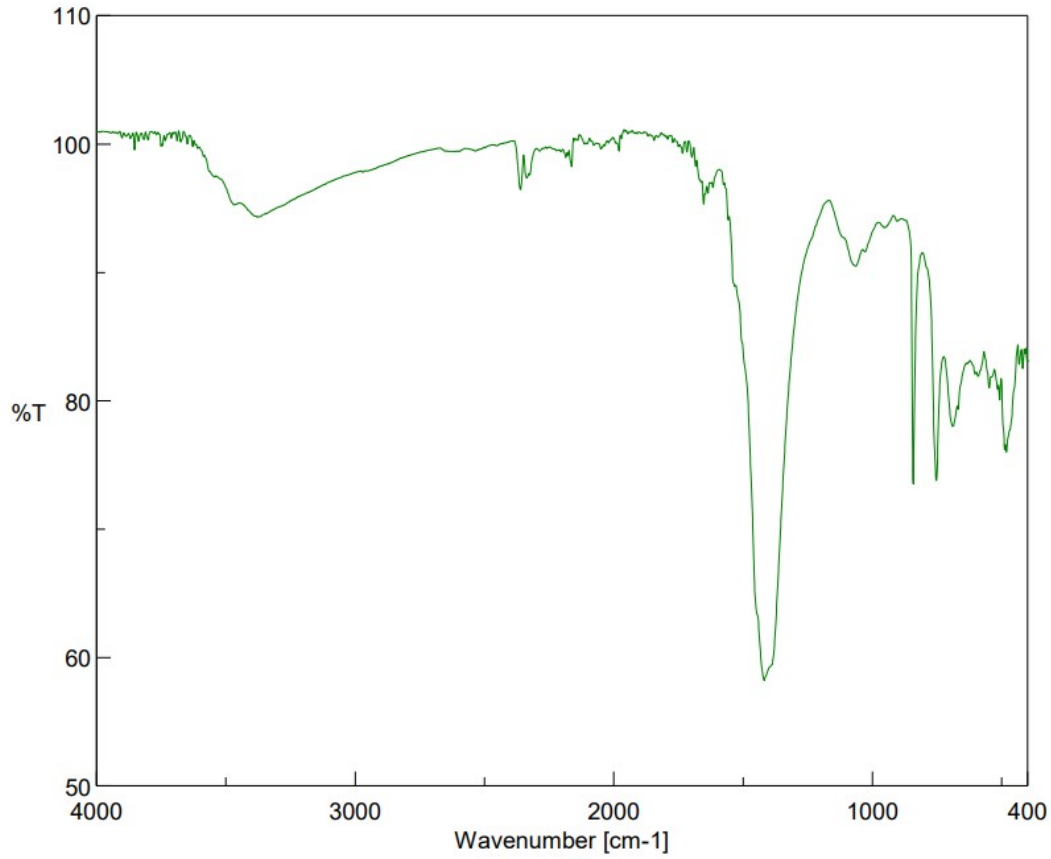


Fig. S8. FT-IR spectra of **M4.5-Zn-BIC**.

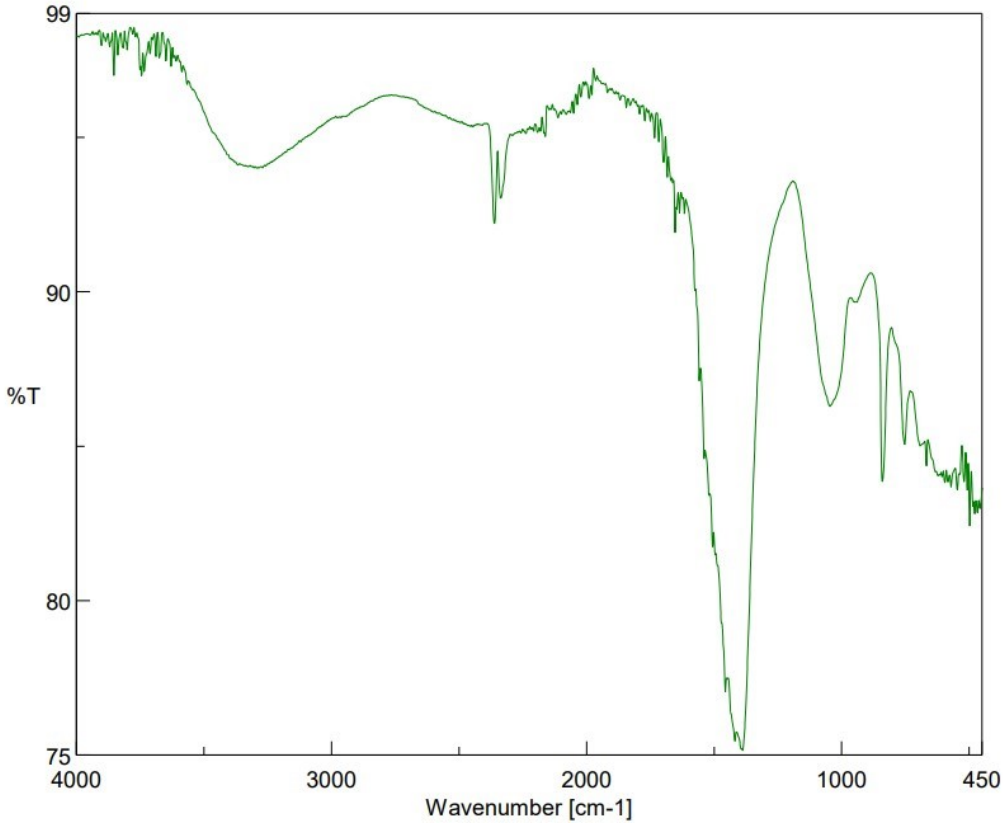


Fig. S9. FT-IR spectra of **M4.5-Zn-BIC-2H_2O**.

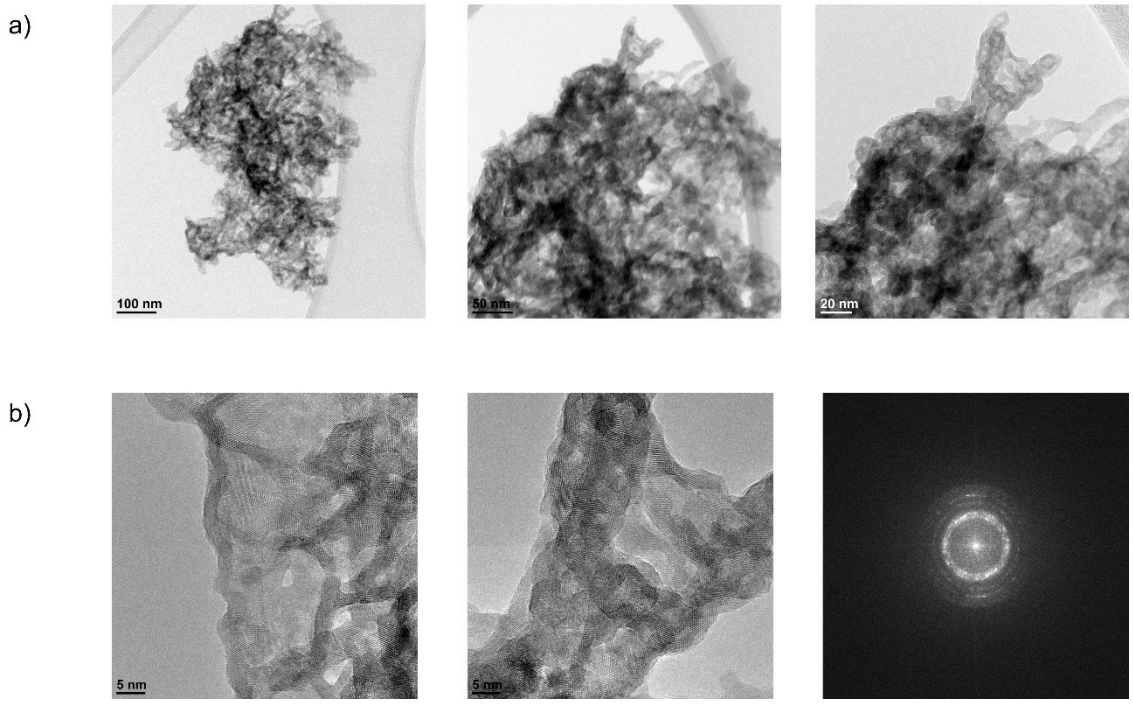


Fig. S10. Characterisation of **Aq-Zn-BIC. a)** Transmission electron microscopy (TEM). **b)** High Resolution TEM (HR-TEM) inset Fast Fourier transform (FFT) patterns from HRTEM images.

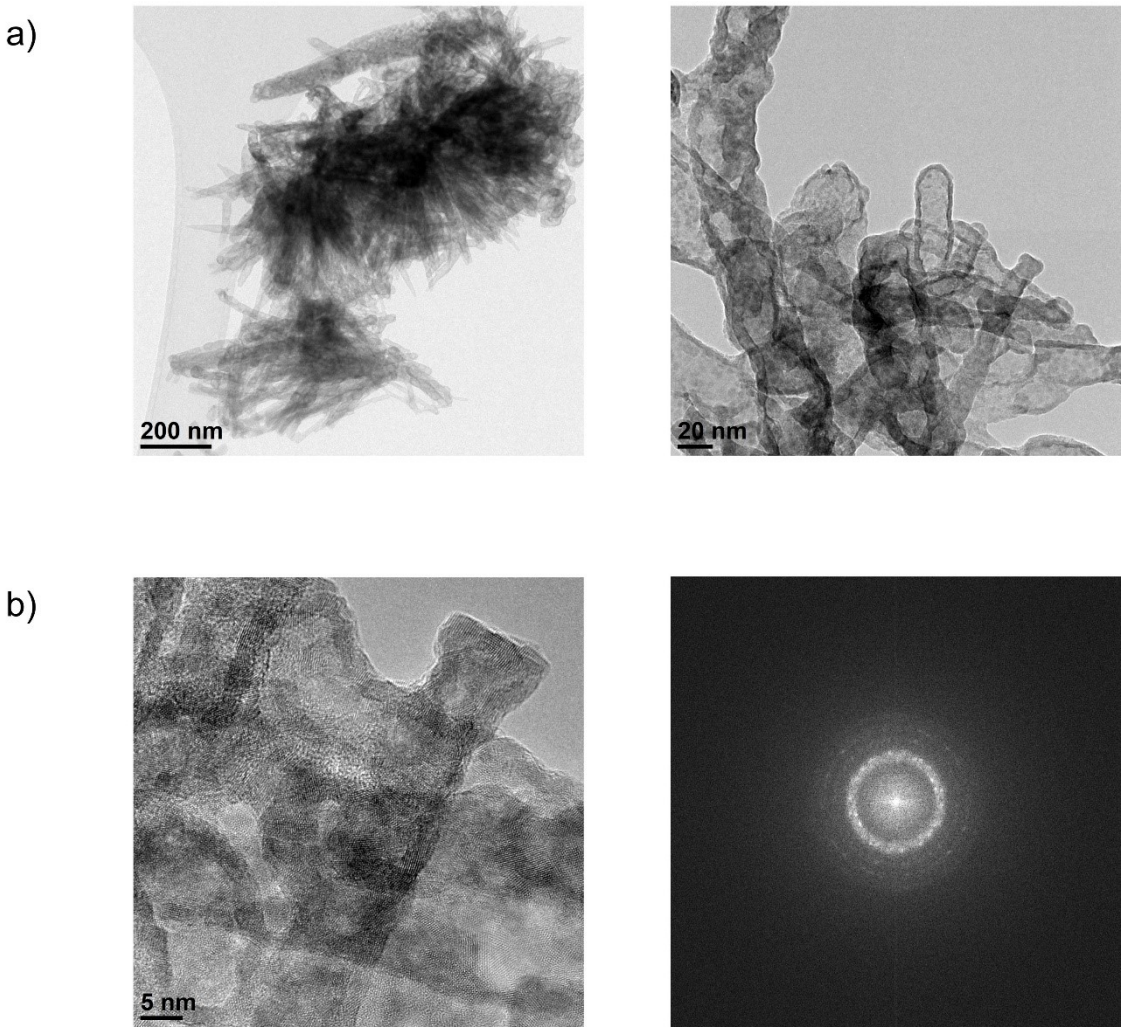


Fig. S11. Characterisation of **M7-Zn-BIC. a)** Transmission electron microscopy (TEM). **b)** High Resolution TEM (HR-TEM) inset Fast Fourier transform (FFT) patterns from HRTEM images.

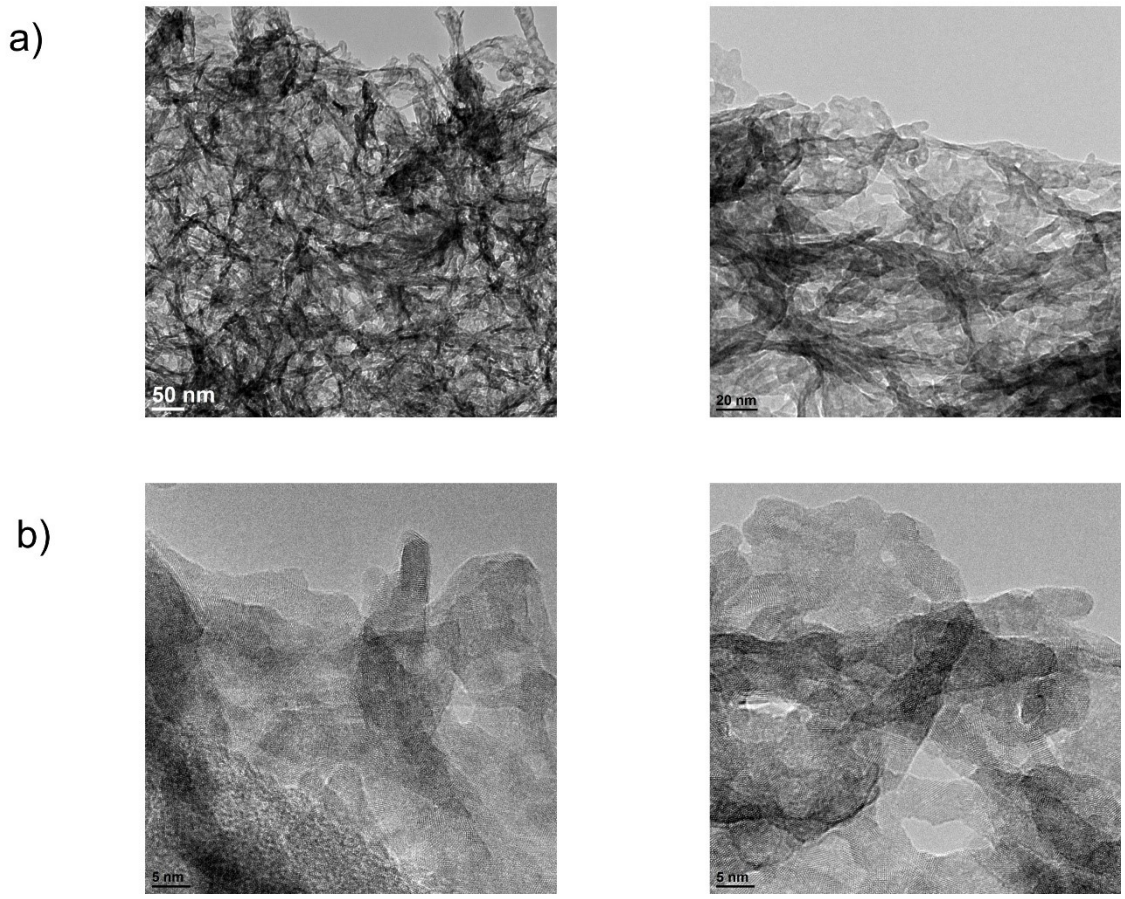


Fig. S12. Characterisation of **M4.5-Zn-BIC. a)** Transmission electron microscopy (TEM). **b)** High Resolution TEM (HR-TEM).

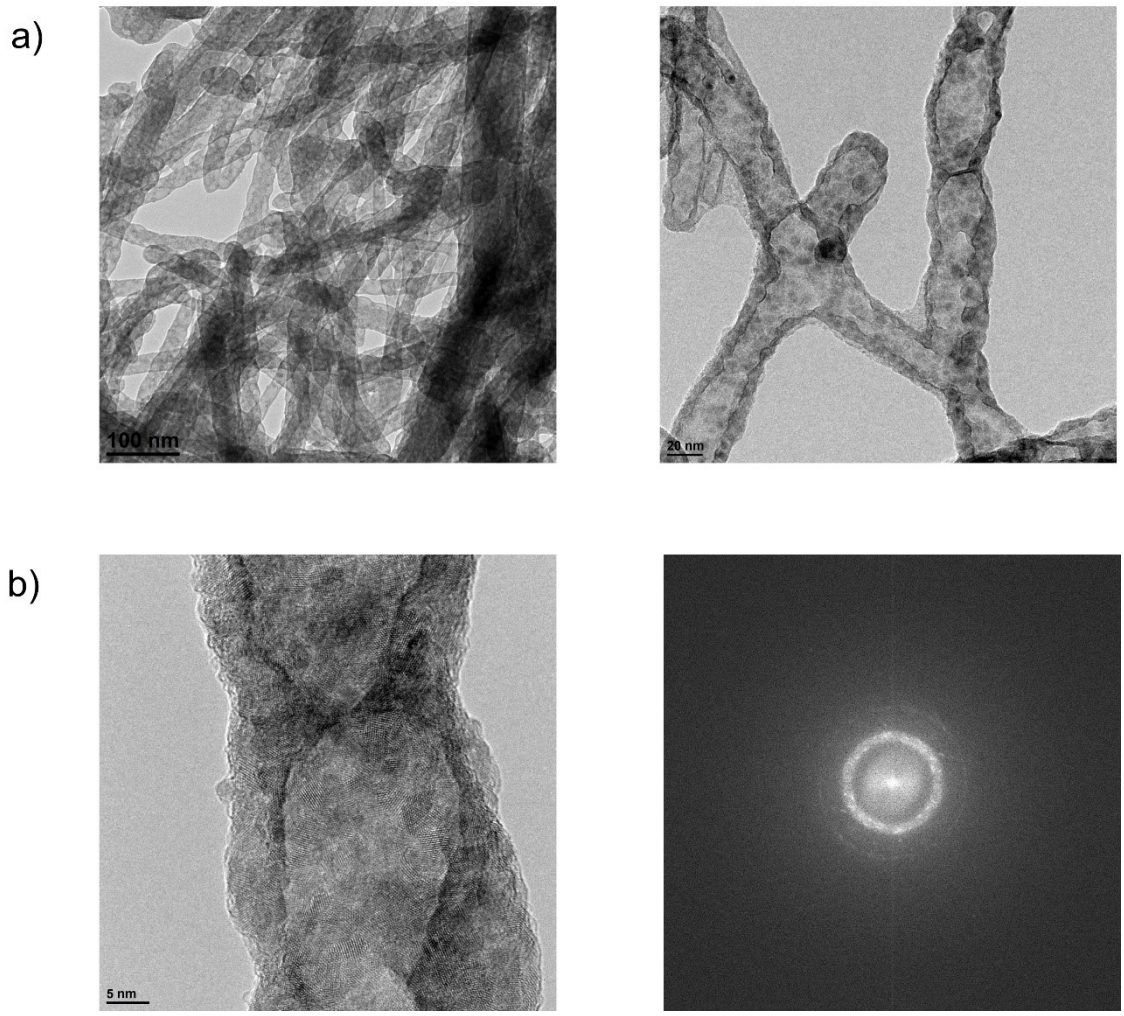
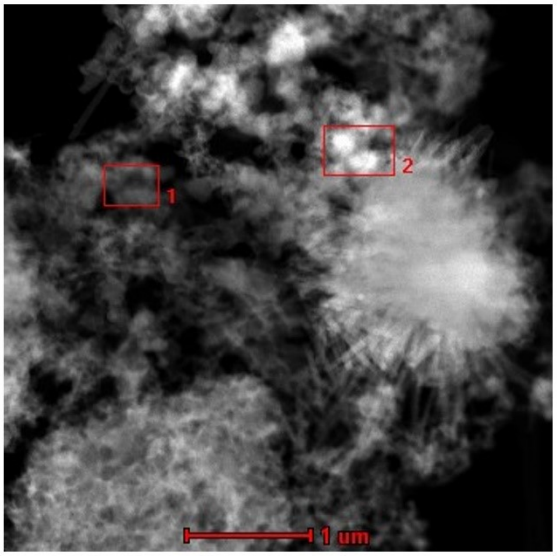


Fig. S13. Characterisation of **M4.5-Zn-BIC-2H_2O. a)** Transmission electron microscopy (TEM). **b)** High Resolution TEM (HR-TEM).

a)



b)

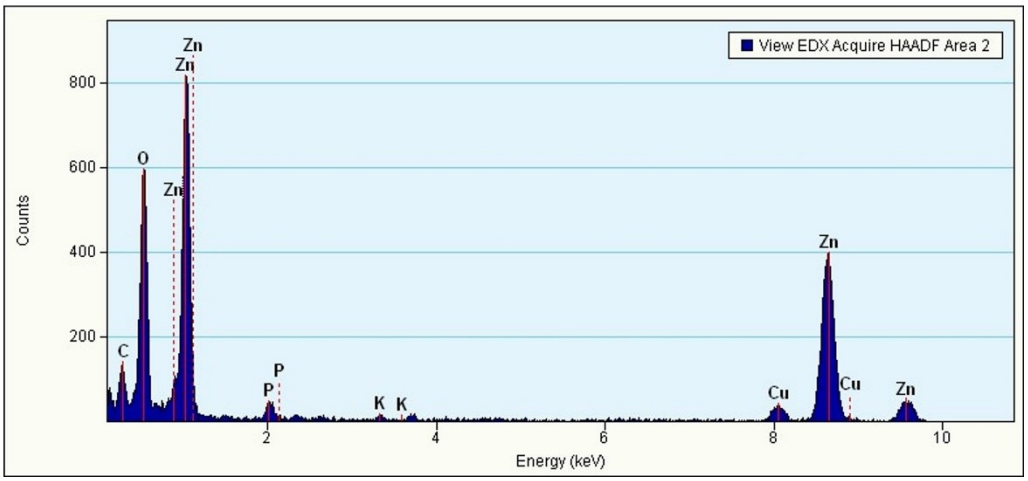
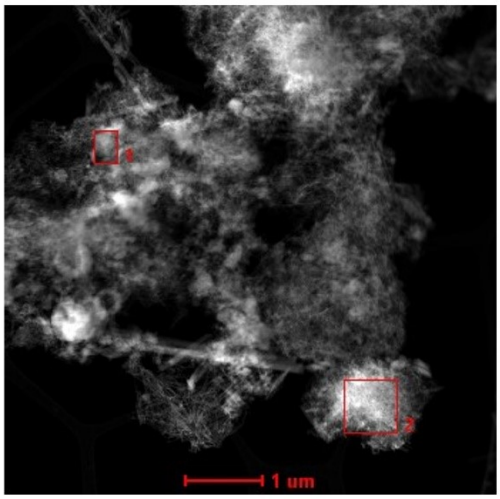


Fig. S14. a) STEM image of **M7-Zn-BIC; b)** HAADF spectra.

a)



b)

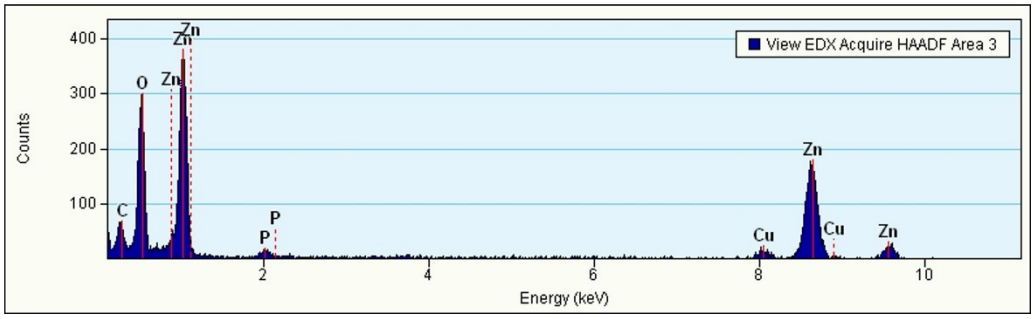
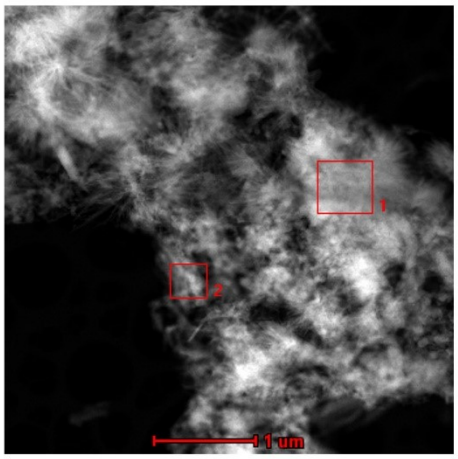


Fig. S15. a) STEM image of **M4.5-Zn-BIC; b)** HAADF spectra.

a)



b)

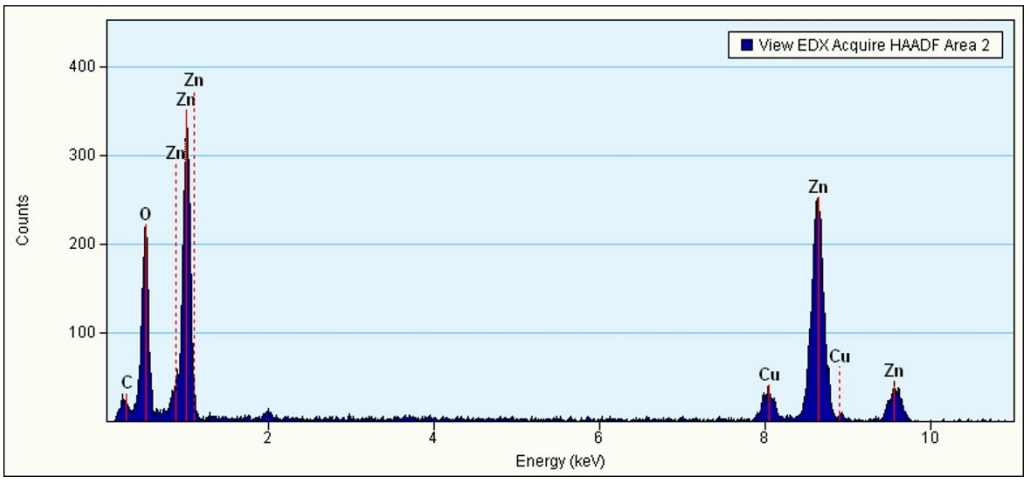


Fig. S16. a) STEM image of **M4.5-Zn-BIC-2H_2O; b)** HAADF spectra.

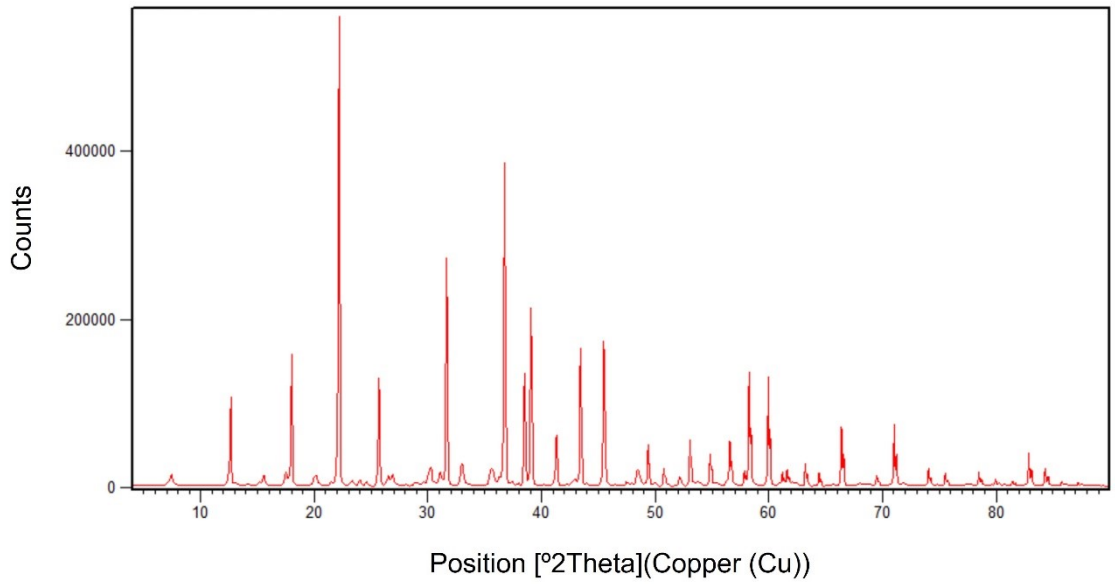


Fig. S17. XDR pattern of **M7-Zn-BIC-2H_2O-P**.

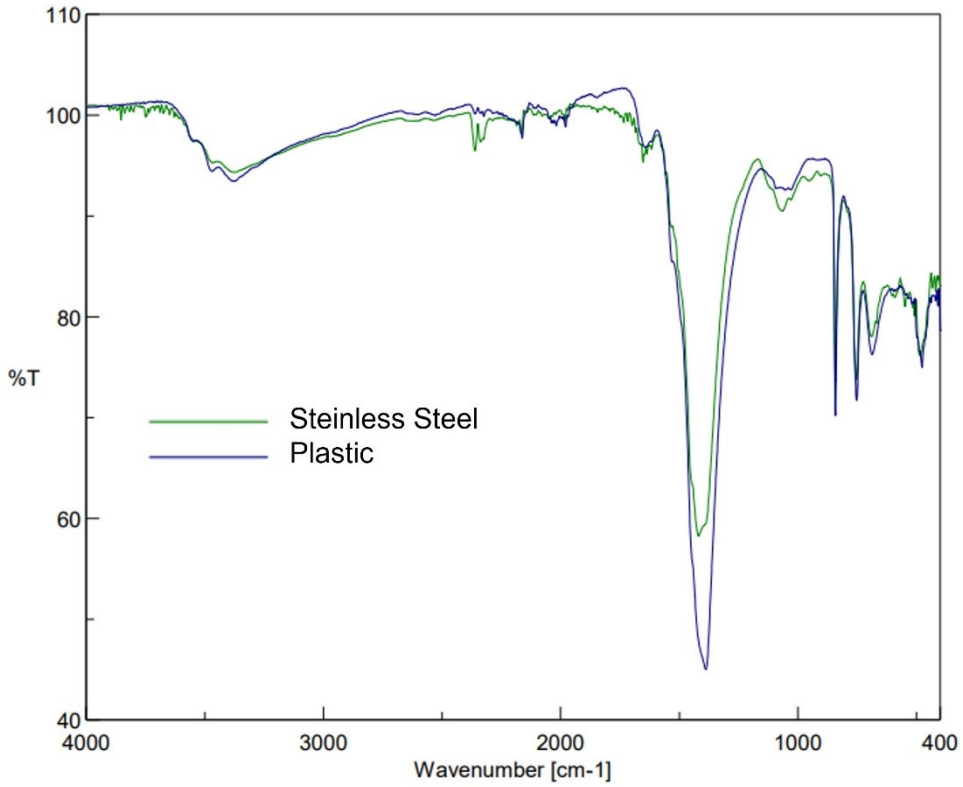


Fig. S18. FT-IR spectra of **M7-Zn-BIC -2H_2O** (green line, stainless steel grinding balls) and **M7-Zn-BIC-2H_2O-P** (blue line, plastic grinding balls).

Table S1. Experimental conditions and yield of the mechanochemical synthetised Zn bionanohybrids.

Zn bionanohybrid	Ball milling method	Grinding balls diameter (nm)	Water content (mL)	Yield (mg)
M7-Zn-BIC	Planetary	7	0	64
M7-Zn-BIC-2H_2O	Planetary	7	2	117
M4.5-Zn-BIC	Planetary	7	0	51
M4.5-Zn-BIC-2H_2O	Planetary	7	2	164
M7-Zn-BIC-2 H_2O-P	Planetary	7	2	251
M-Zn-PHOS	Horizontal	4.5	2	108

Table S2. Content of Zn in the different bionanohybrbids determined by ICP-OES.

Zn bionanohybrid	Amount of Zn (%)
Aq-Zn-BIC	40
M7-Zn-BIC	12
M7-Zn-BIC-2H_2O	9
M4.5-Zn-BIC	30
M4.5-Zn-BIC-2H_2O	7
Aq-Zn-PHOS	53
M-Zn-PHOS	33