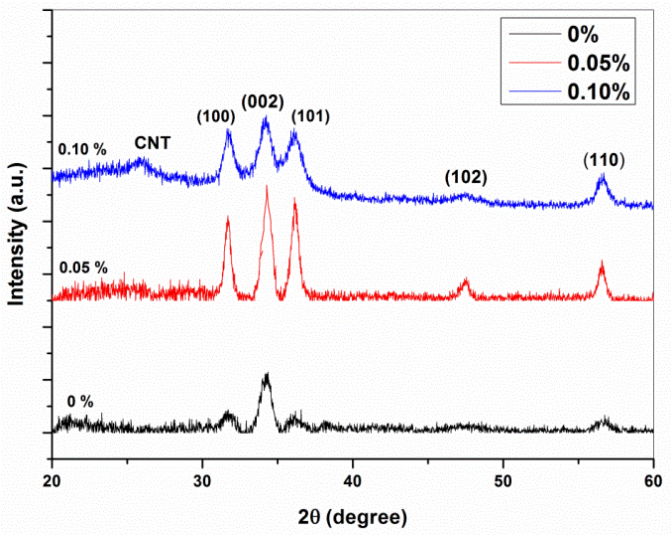
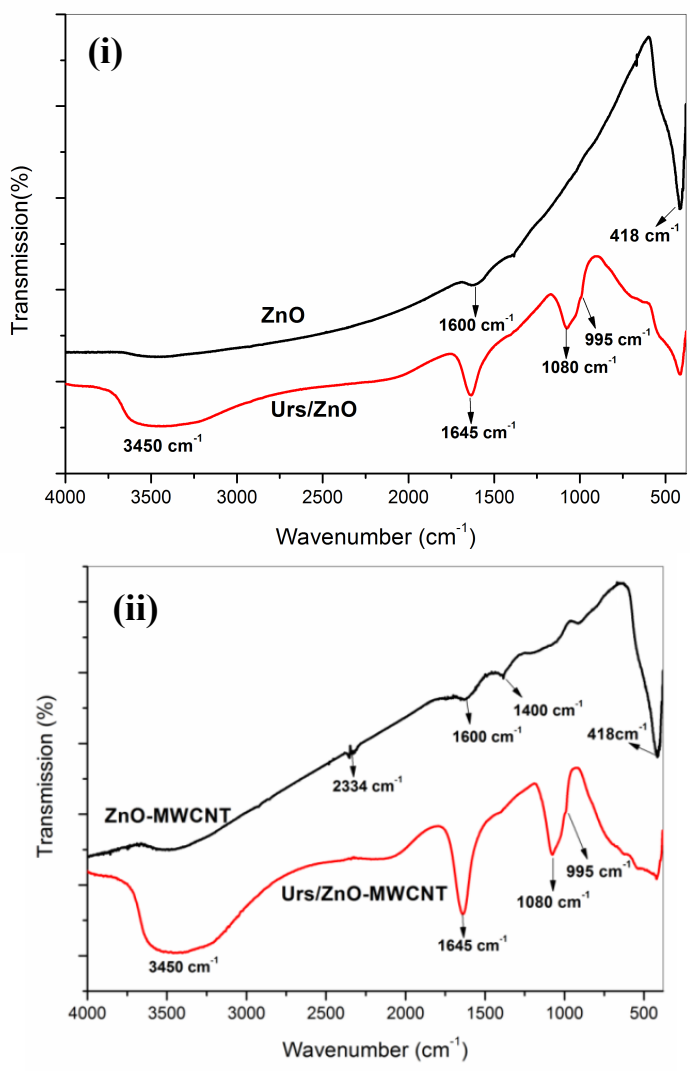
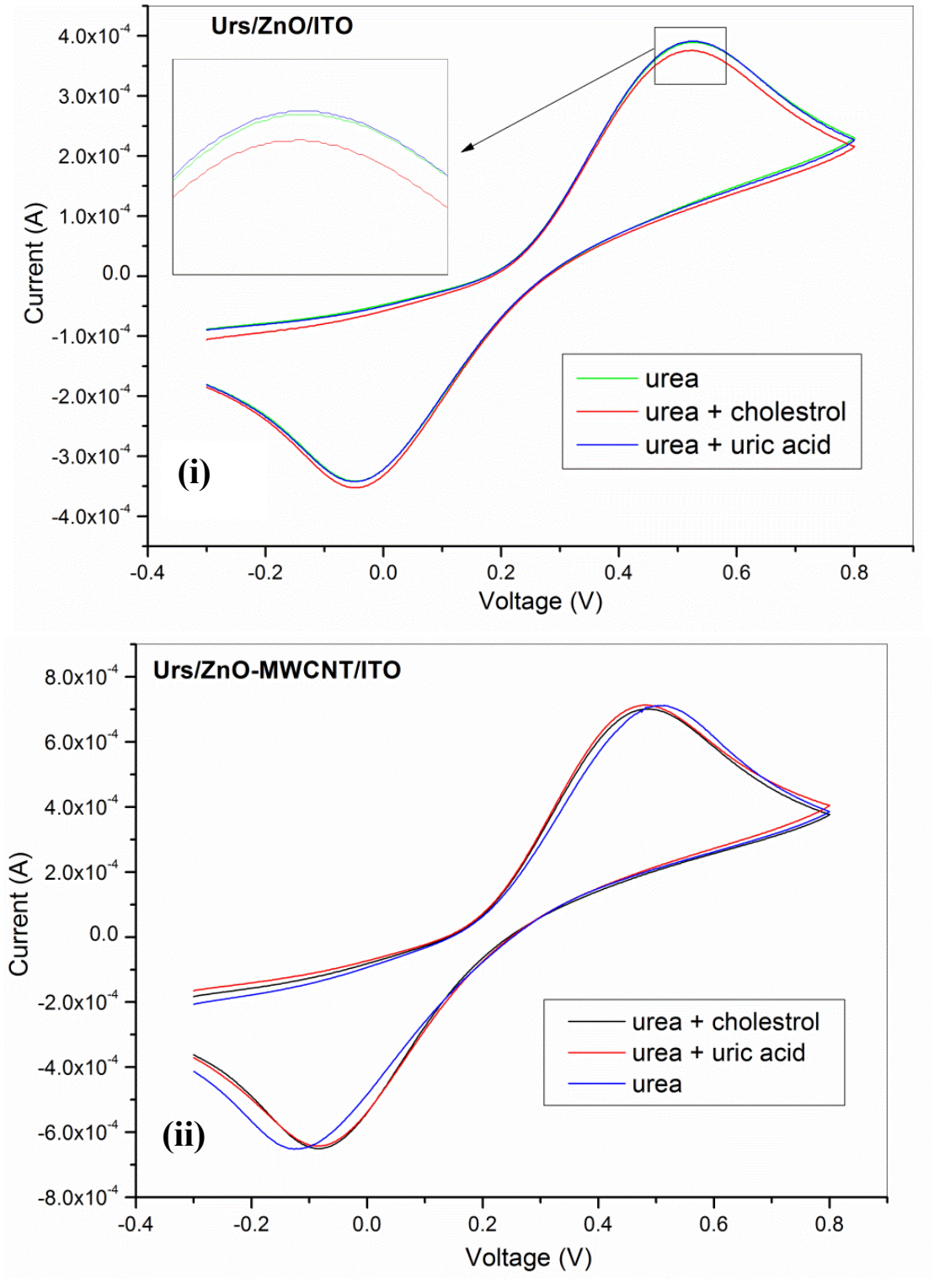


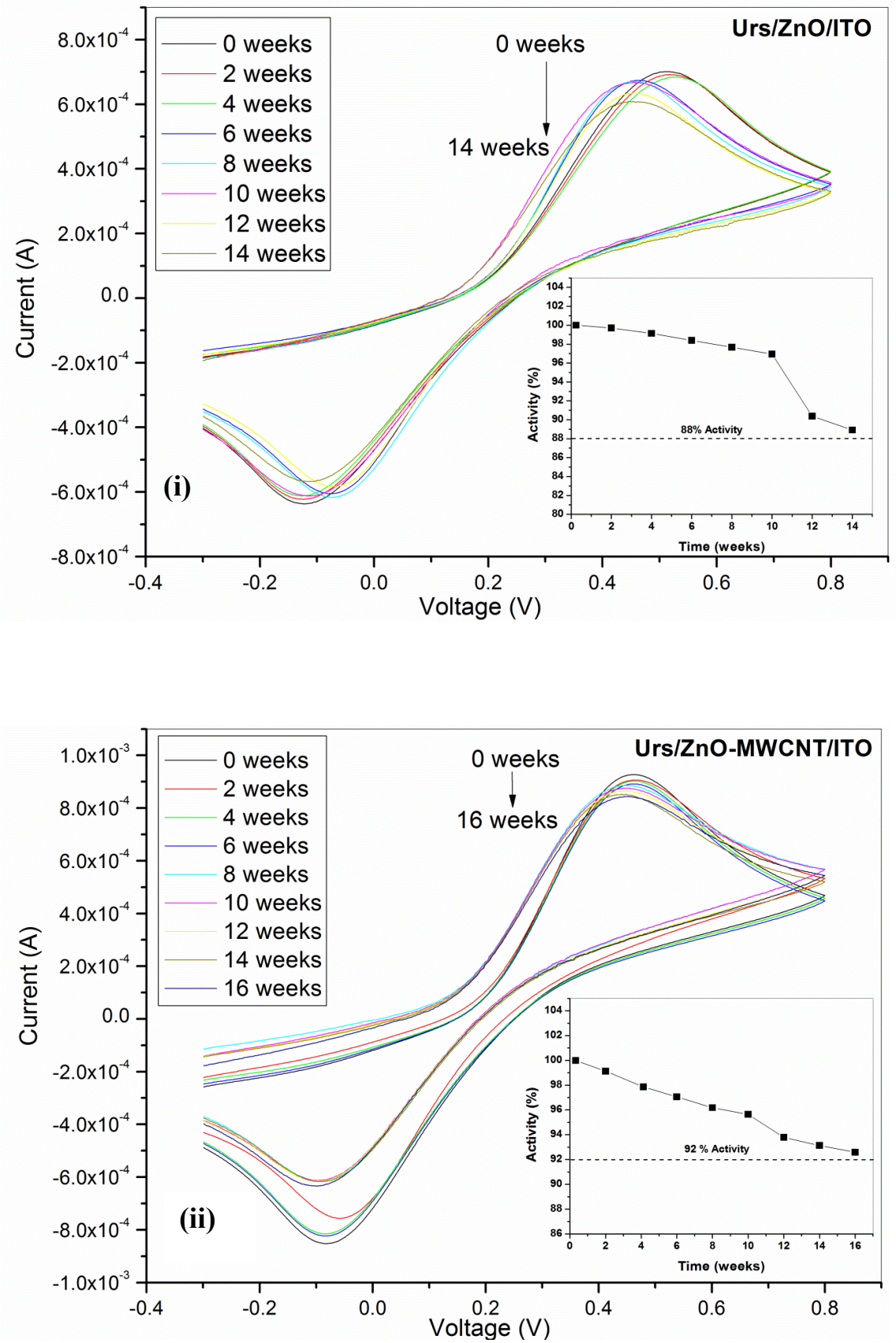
Supplementary fig. 1 XRD spectra of ZnO-MWCNTs nanocomposite thin films with varying MWCNTs concentration (0–0.1 wt. %).



Supplementary fig. 2 FTIR spectra of (i) ZnO and (ii) ZnO-MWCNTs hybrid composite thin films before and after immobilization of urease (Urs).



Supplementary fig. 3 Cyclic voltammograms recorded in 50 mM PBS solution containing 5mM $[Fe(CN)_6]^{3-/4-}$ redox mediator for interference study of cholesterol and uric acid for **(i)** Urs/ZnO/ITO and **(ii)** Urs/ZnO-MWCNT/ITO bioelectrodes.



Supplementary fig. 4 Shelf-life study of **(i)** Urs/ZnO/ITO and **(ii)** Urs/ZnO-MWCNT/ITO bioelectrodes.

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Supplementary table 1 The values of charge transfer resistance (R_{CT}) obtained for various electrodes.

Electrode	R_{CT}
ITO	390.55 Ω
ZnO/ITO	273.00 Ω
Urs/ZnO/ITO	351.07 Ω
ZnO-MWCNT/ITO	208.32 Ω
Urs/ZnO-MWCNT/ITO	276.00 Ω

Supplementary table 2 A comparison of biosensing response characteristics obtained for the bare ZnO and hybrid ZnO-MWCNTs nanocomposite based bioelectrodes towards urea.

Matrix	Sensitivity ($\mu A/mM/cm^2$)	K_m value (mM)	Surface coverage (mol/cm^2)	Enzyme Activity ($Units/cm^2$)	Shelf-life (weeks)
ZnO	40.6	1.45	1.08×10^{-8}	2.20×10^{-2}	14
ZnO-MWCNTs	43.0	0.85	1.88×10^{-7}	2.73×10^{-2}	>16