Supplementary Information File

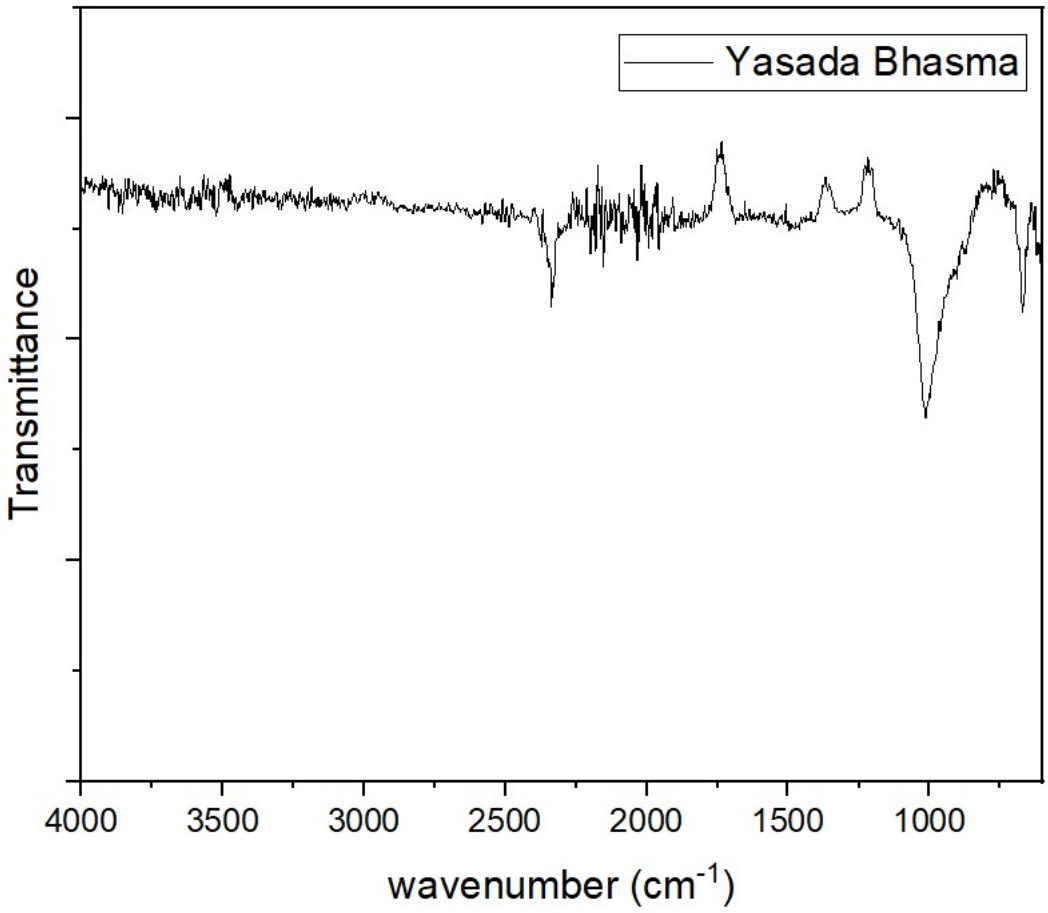


Fig S1: FTIR spectra of as-received Yasada Bhasma

- **Zn–O lattice vibrations:** a strong/characteristic absorption band **below ~600 cm⁻¹** (commonly ~400–600 cm⁻¹, often cited ~430–500 cm⁻¹).

- **O–H / adsorbed water:** broad band ~3400 cm⁻¹ if surface hydroxyl/water present.

- **Carbonates / adsorbed CO_2:** bands near **~1400–1500 cm⁻¹** and **~870 cm⁻¹** when carbonate species (e.g., $ZnCO_3$ or surface carbonates) are present.

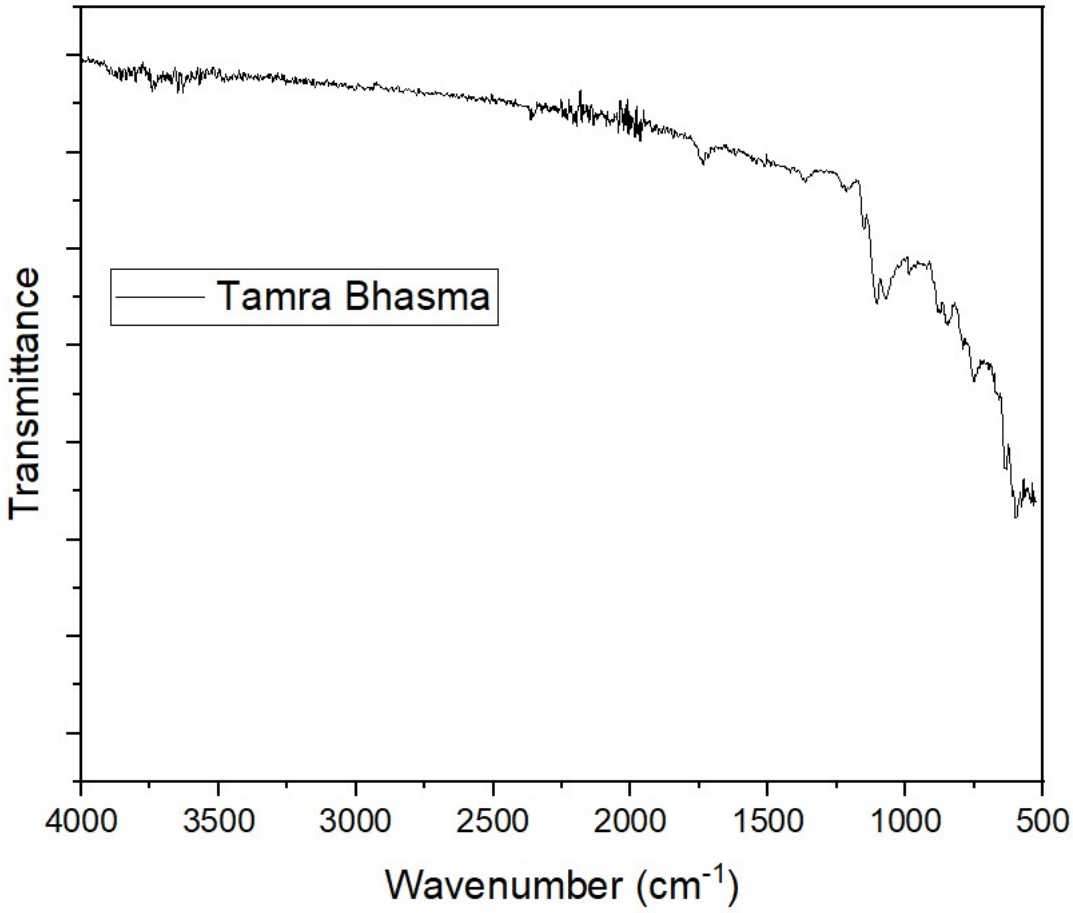
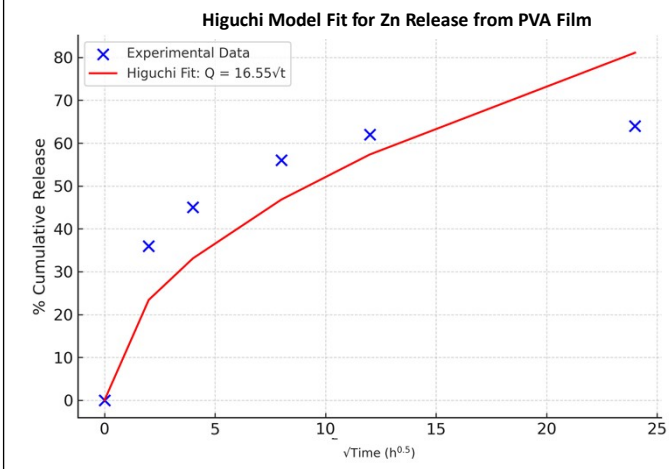
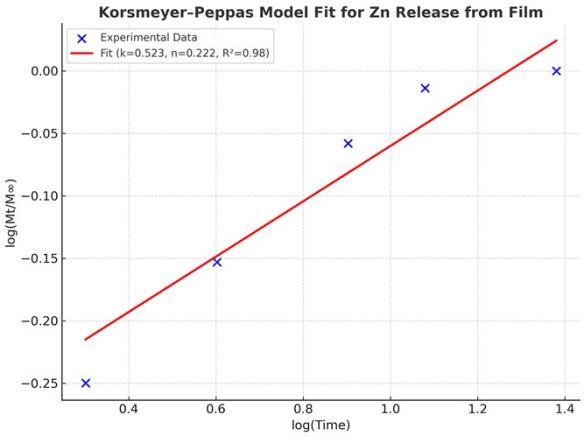
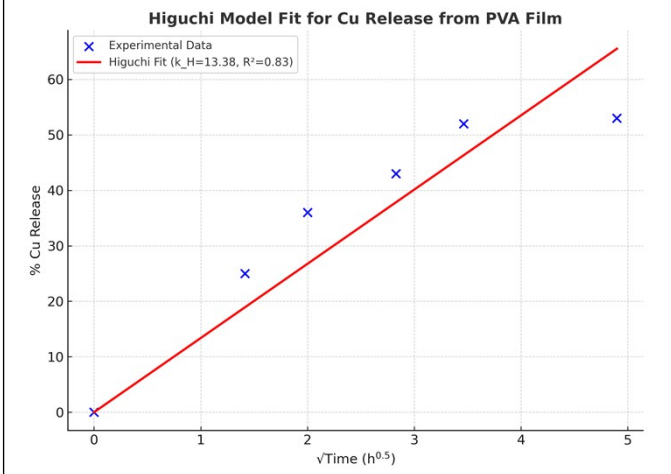
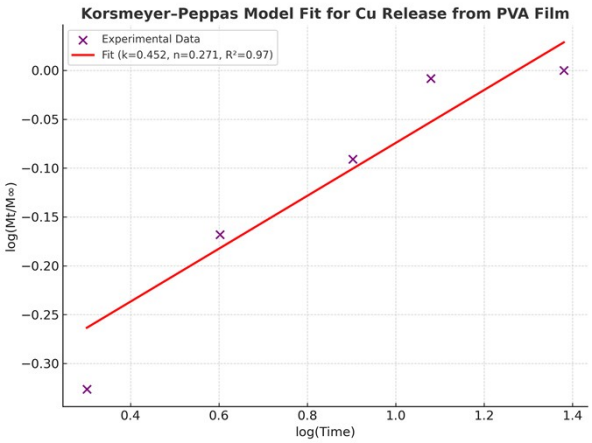
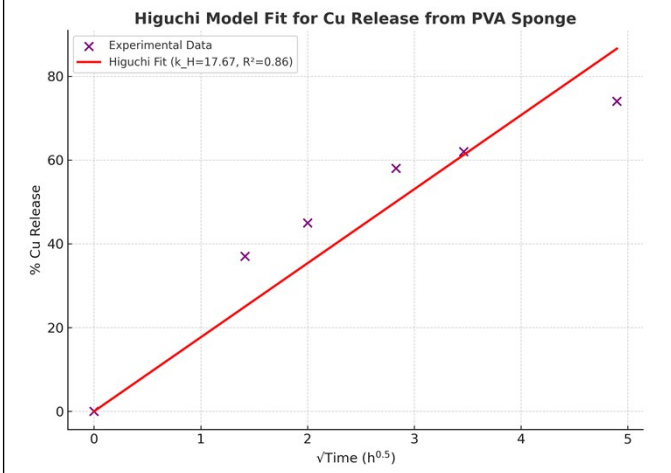
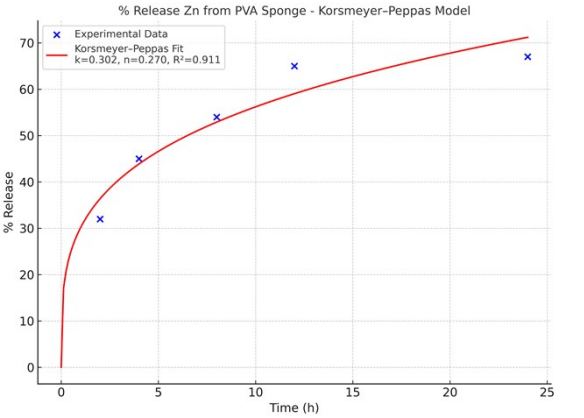
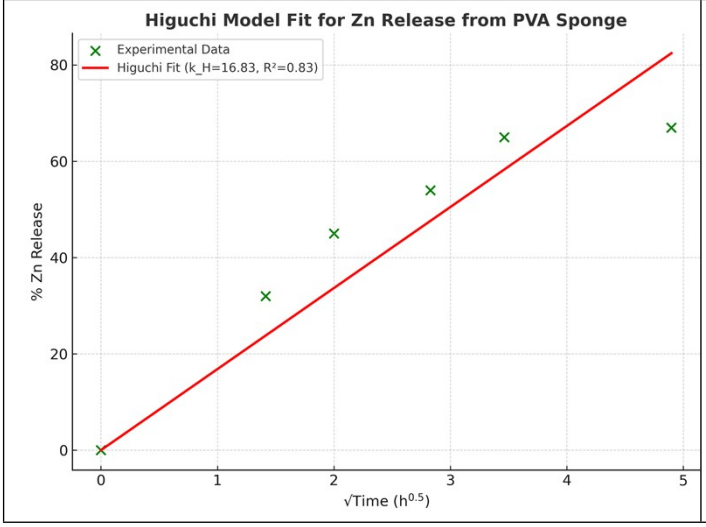
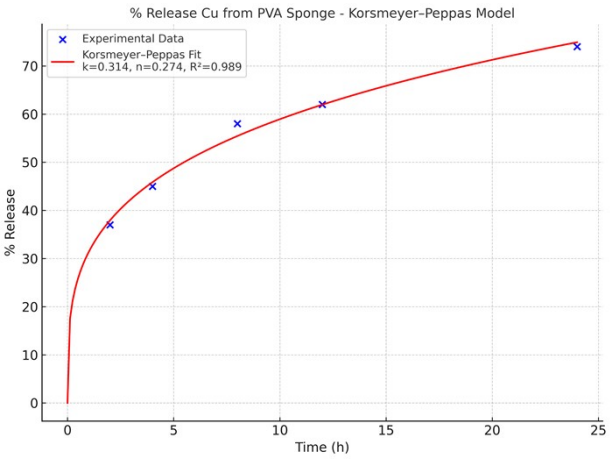


Fig S2: FTIR spectra of as-received Tamra Bhasma

A dramatic fall in transmittance between ~700–500 cm^{-1}. This matches the Cu–O lattice modes of CuO/Cu_2O almost on cue. Gentle slope across 4000–1200 cm^{-1}, without distinct bands suggests minimal organic residues, no significant carbonate/hydroxyl signatures, a largely inorganic, oxide-dominated composition.

Higuchi Model Fitted Curves	KP Model Fitted Curves
	
	
	
	

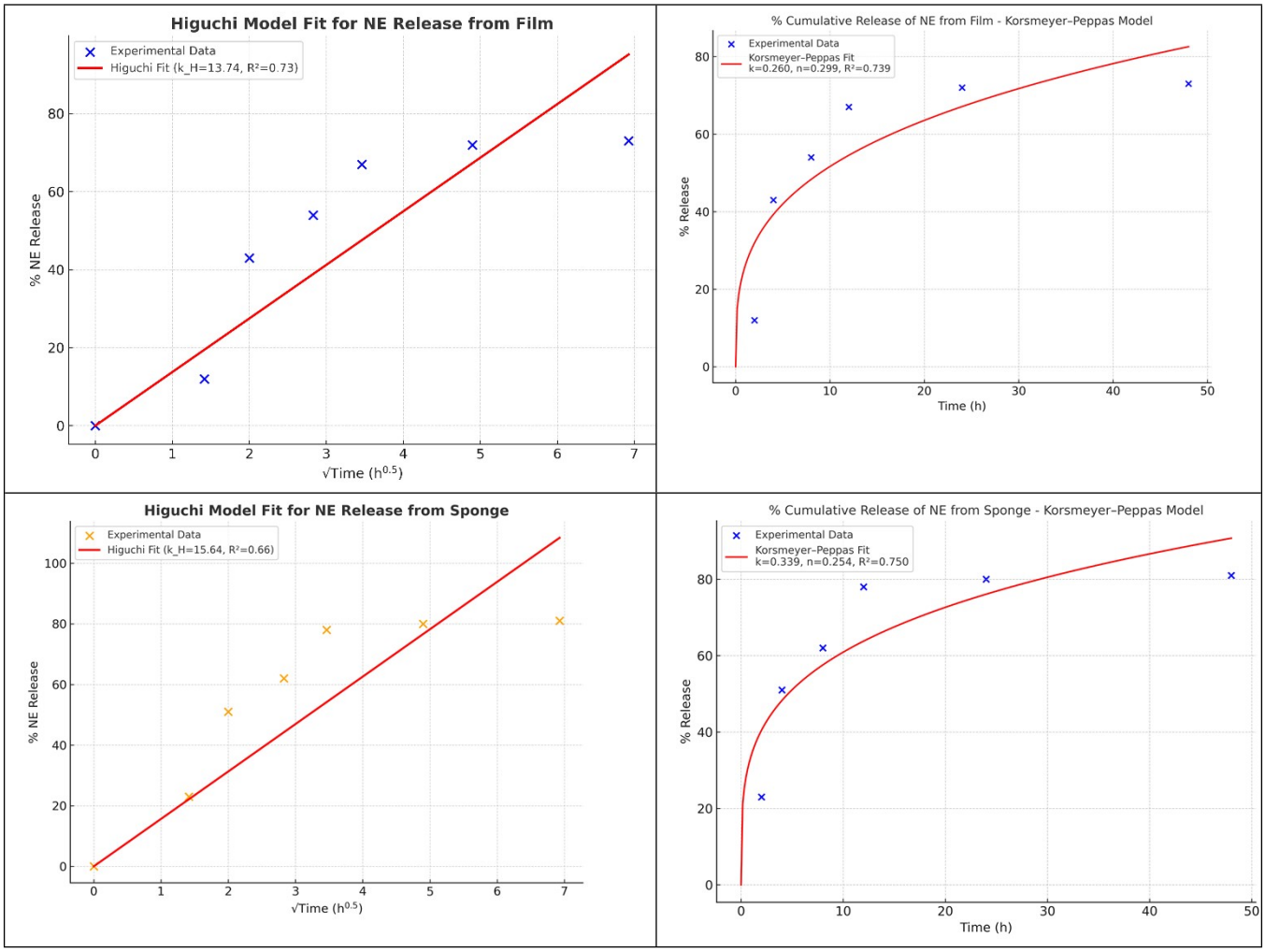


Fig S3: Table showing fitting of Higuchi models (Left column) and KP models (Right column) for release kinetics of Zinc, Copper and Nano-emulsion.

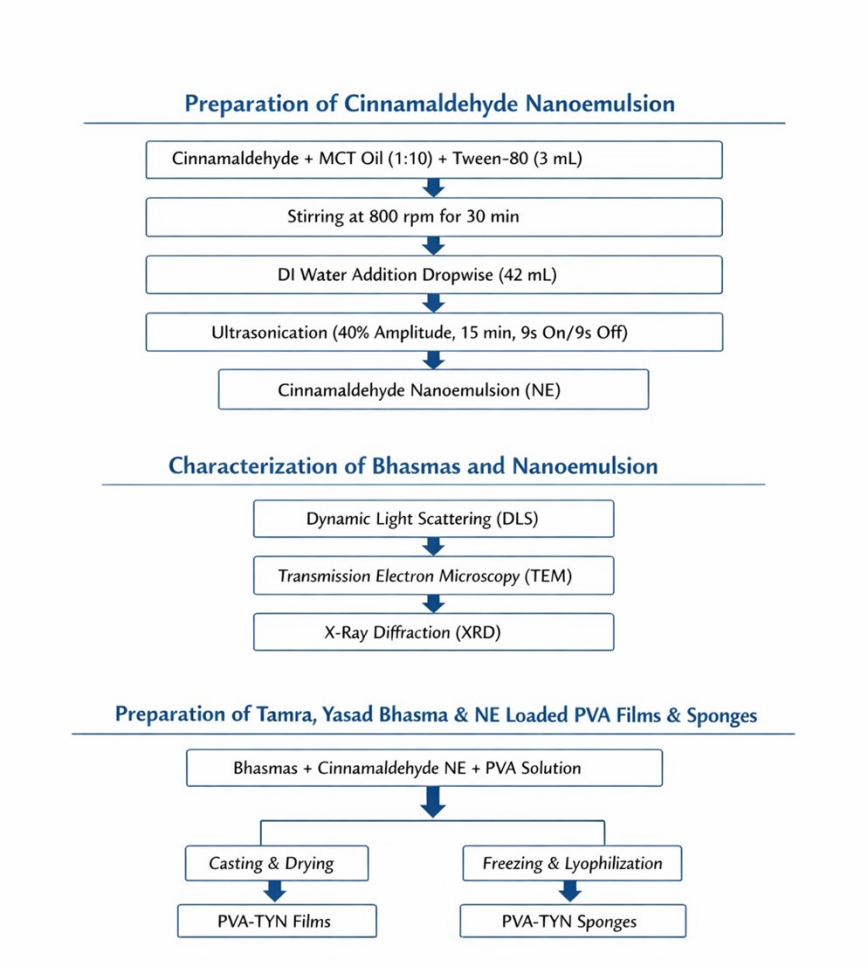


Fig S4: Flow chart showing preparation protocol of nano-emulsion and PVA based sponge and film