Synthesis and application of polypyrrole coated tenorite nanoparticles (PPy@TN) for the removal of anionic food dye 'Tartrazine' and divalent metallic ions viz. Pb(II), Cd(II), Zn(II), Co(II), Mn(II) from synthetic wastewater

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S.1. FTIR discussion of tenorite nanoparticle, polypyrrole coated tenorite nanoparticles (PPy @TN) and tartrazine loaded nanoparticles (TZ-PPy@ TN):

FTIR spectrum of tenorite nanoparticle, polypyrrole coated tenorite nanoparticles (PPy @TN) and tartrazine loaded nanoparticles (TZ-PPy@ TN) was recorded in the range of 400–4000 cm⁻¹ (Fig S1). All three characteristics peak of Cu-O were observed in the range of 450-593cm⁻¹ which confirms the formation of CuO phase¹. FTIR of PPY@TN nanoparticles is totally different from bare TN nanoparticles which support the modification of tenorite surface. FTIR results support SEM results. Characteristic peak of CuO was also observed in PPY@TN nanoparticles.

In FTIR PPy @TN, a broad peak was observed in the range of 3000 to 3500cm⁻¹ which can be ascribed to N–H stretching vibrations for nitrogen in the pyrrole rings, O–H stretching of water and C–H bonds while peaks at 782, 1154 C–H wagging vibration, breathing vibration of the pyrrole ring^{2,3,4}. The peaks near 1044, 963cm⁻¹ can be ascribed to the C–H in-plane, C–H out-of-plane deformation vibrations, respectively while the peaks at 1536 and 1453cm⁻¹ correspond to C=C and C-N stretching vibration³. Appearance of one peak at 1299 cm⁻¹ is due to the C–C in-ring stretching and C–N in-plane deformation^{5,6}. In FTIR of TZ-PPY@TN peak at 3447cm⁻¹ is due to O–H stretching of water molecule. Characteristic peaks of CuO phase disappeared due to TZ loading which suggest that these groups takes part to interact with dye molecules. Else characteristics peaks are similar to PPY@TN nanoparticles.



Fig.S1. FTIR of (a) tenorite nanoparticle, (b) (PPy @TN) and (c) (TZ-PPy@TN).



Fig.S2. (a) Nitrogen adsorption-desorption isotherm plot for tenorite nanoparticle and (b) tartrazine loaded nanoparticles (TZ-PPy@ TN).

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