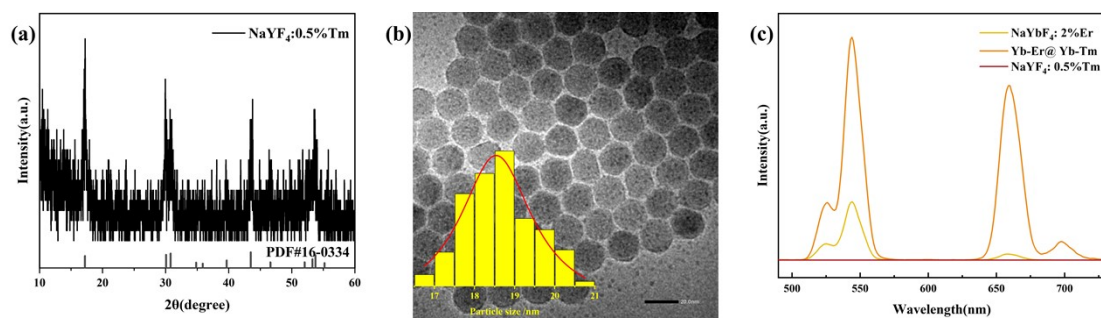


Supporting information



S1. (a) X-ray diffraction patterns of NaYF₄:0.5%Tm³⁺ UCNPs; (b) Transmission electron micrographs of NaYF₄:0.5%Tm³⁺ UCNPs are shown, with the inset displaying the statistical diagram of nanoparticle size for NaYF₄:0.5%Tm³⁺ UCNPs; and (c) The upconversion spectra of NaYbF₄:2%Er³⁺, NaYbF₄:2%Er³⁺@NaYbF₄:0.5%Tm³⁺ (Yb-Er@Yb-Tm) and NaYF₄:0.5%Tm³⁺ UCNPs ($\lambda=1530$ nm, P=0.35 W).