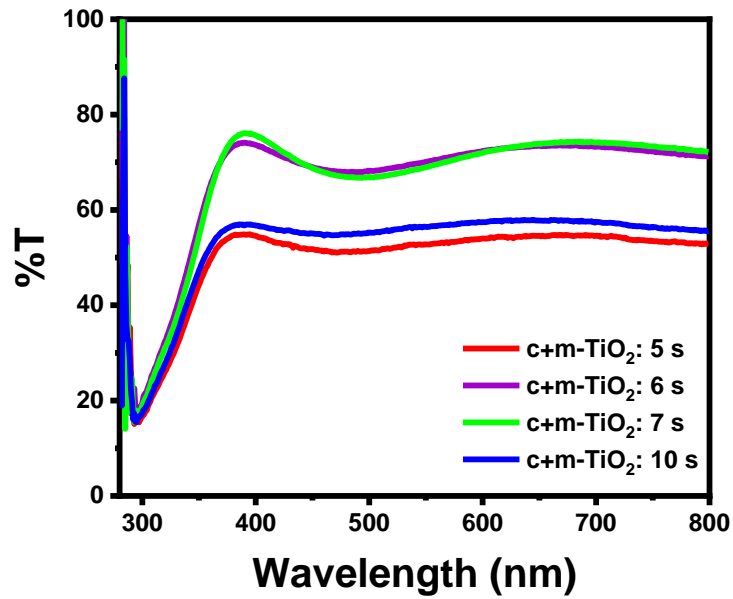


S1: Grain size distribution histograms of m-TiO₂ films deposited at different times. The histograms show the frequency of grain sizes obtained from FE-SEM image analysis (via ImageJ) for deposition times of (a) 15 s, (b) 30 s, (c) 45 s, and (d) 60 s. The data indicate a shift toward larger grain sizes with increasing deposition time, consistent with agglomeration and coalescence of nanoparticles. Error bars represent the statistical variation in grain sizes extracted from multiple regions of each sample



S2: V-Vis transmittance spectra of c+m-TiO₂ films deposited for 5 s, 6 s, 7 s, and 10 s. The spectra show a strong absorption edge below ~380 nm, corresponding to the TiO₂ band gap region, followed by increased transmittance in the visible range. The sample deposited for 7 s exhibits the highest transmittance (~80%) in the 400–600 nm region, suggesting reduced light scattering and improved film uniformity at this deposition time, whereas films deposited for shorter (5–6 s) or longer (10 s) times show lower transmittance, likely due to incomplete coverage or agglomeration effects.