

Photochromic textiles based upon aqueous blends of oxygen-deficient WO_{3-x} and TiO_2 nanocrystals

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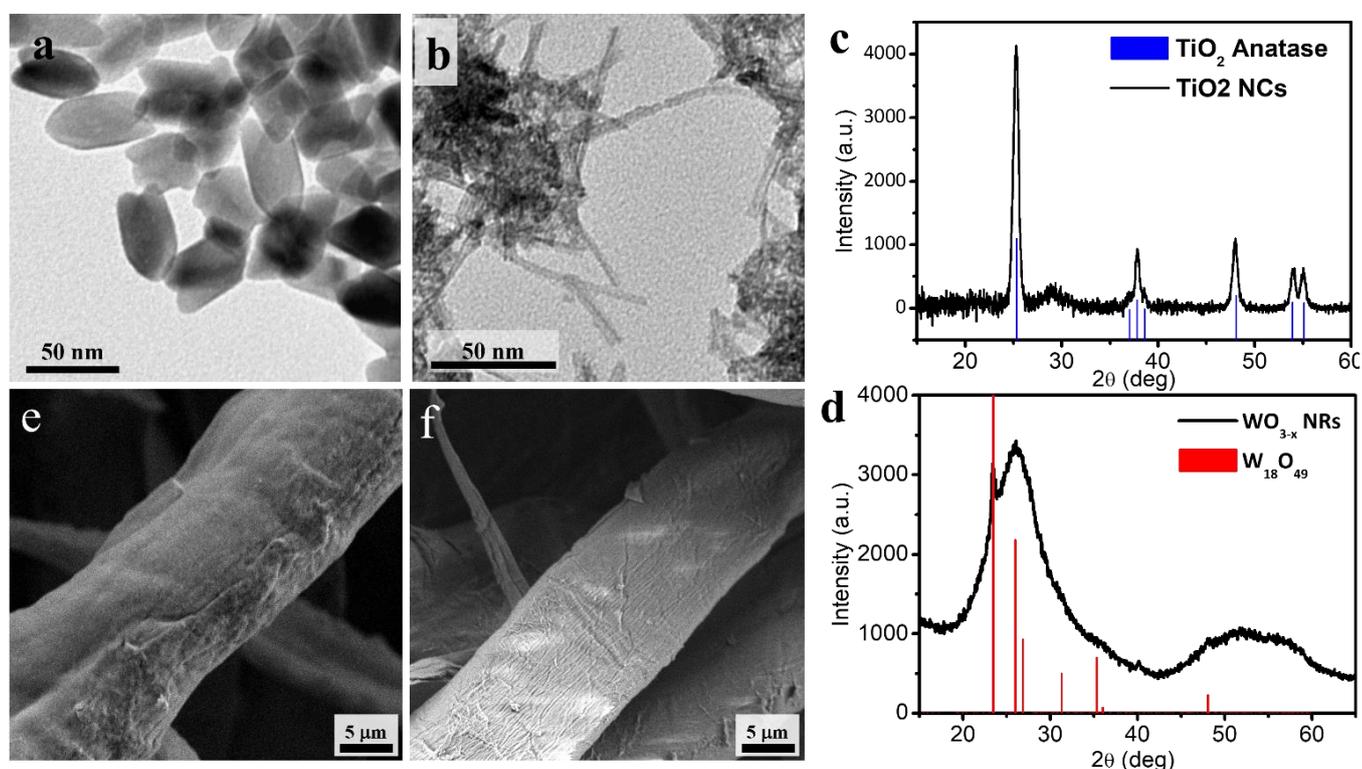


Figure S1: TEM of (a) TiO_2 seeds and (b) WO_x nanorods; XRD diffraction pattern of as-synthesized (c) TiO_2 NCs (reference patten of TiO_2 anatase ICSD code #9852) and (d) WO_{3-x} NCs (reference patten of $\text{W}_{18}\text{O}_{49}$ anatase ICSD code # 080057); SEM pictures of (e) textiles functionalized with NCs solution prepared with WO_{3-x} : TiO_2 ratio of 25% and (f) pristine textile

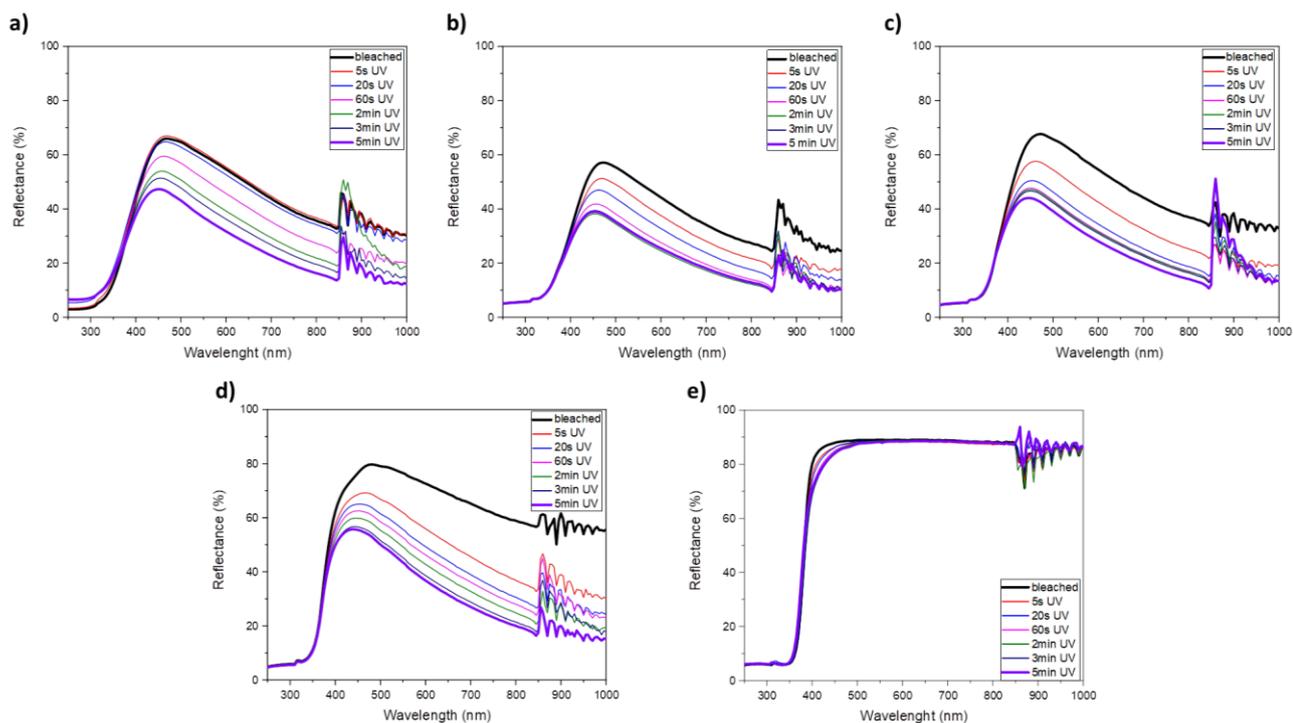


Figure S2: Reflectance spectra of NCs impregnated textiles in the bleached state and for different UV irradiation times: (a) 100% WO_{3-x} ; (b) 75% WO_{3-x} ; (c) 50% WO_{3-x} ; (d) 25% WO_{3-x} ; (e) 0% WO_{3-x} .

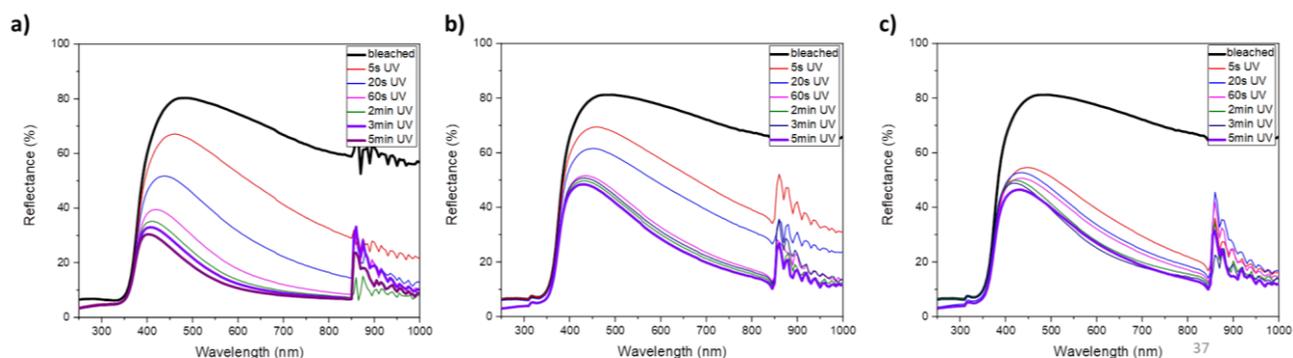


Figure S3: Reflectance spectra of $\text{WO}_{3-x}:\text{TiO}_2$ (1:3) (25% WO_{3-x}) impregnated textiles soaked with different solvents, in the bleached state and for different UV irradiation times: methanol (a); ethanol (b); 2-propanol (c).

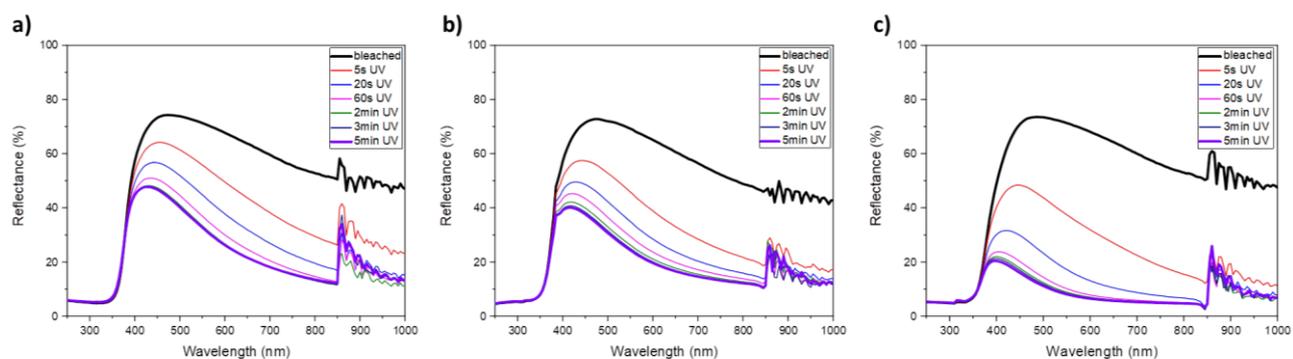


Figure S4: Reflectance spectra of $\text{WO}_{3-x}:\text{TiO}_2$ (1:3) (25% WO_{3-x}) impregnated textiles over-coated with different polymeric matrices, in the bleached state and for different UV irradiation times: starch (a); hydroxyethylcellulose (b); nafion (c).

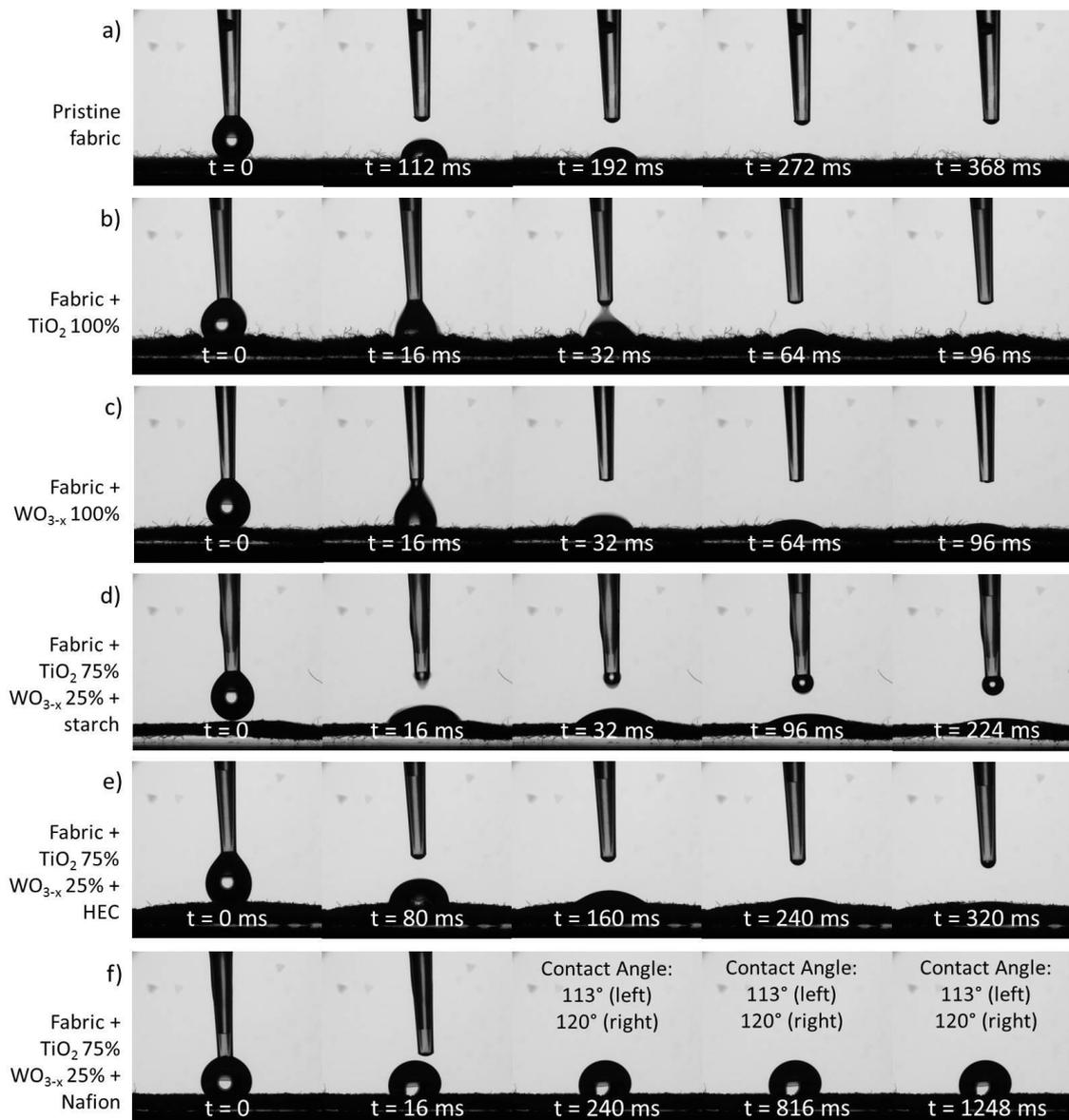


Figure S5. Contact angle measurements on functionalized fabrics. a) pristine fabric; fabrics functionalized with b) TiO_2 100% and c) WO_{3-x} 100%; in these three cases, the highly hydrophilic substrate rapidly adsorbs the drop in less than few hundred milliseconds, and therefore it is not possible to evaluate the contact angle. The presence of TiO_2 (b) or WO_{3-x} (c) nanocrystals increases the surface wettability, speeding up the drop adsorption, which take place in less than 100 ms, also for the other TiO_2 : WO_{3-x} combinations (not reported here). When the fabric is treated with d) corn starch and e) HEC, the hydrophilic nature of the two polymers leads to a behavior similar to the previous ones, but with slightly longer absorption times (a few hundreds of ms); also in this case it is not possible to measure the contact angles. Instead, in the case of Nafion (f), a fluoropolymer, the fabric acquires a good hydrophobicity, with slightly asymmetrical left-right contact angles due to the surface morphology of the fabric.