

## **SUPPLEMENTARY INFORMATION**

# **Anion and cation co-doping of NiO for transparent photovoltaics and smart window applications**

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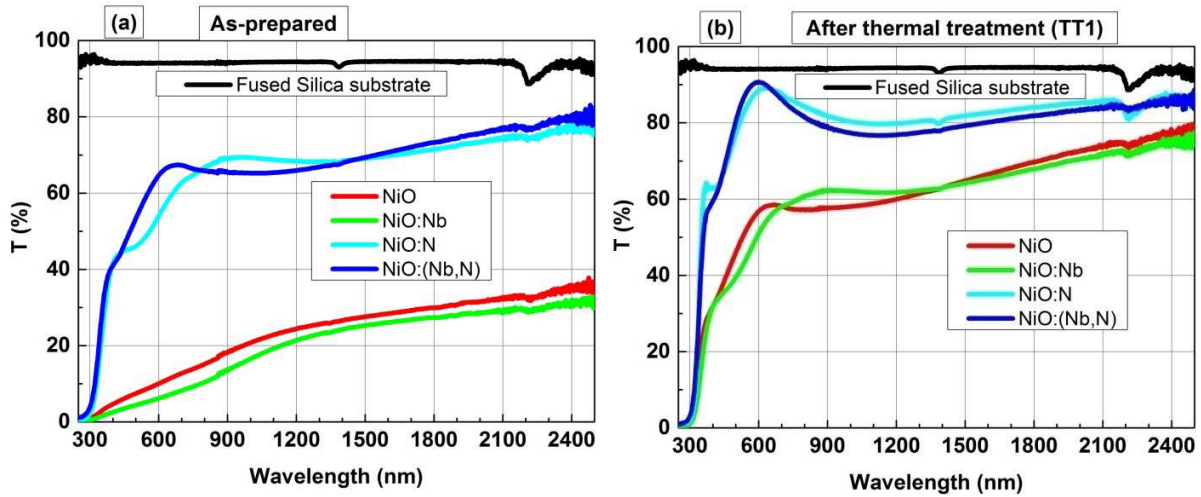
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**Table S1.** Details of the structural and optical properties of the as-prepared undoped NiO film, the single doped NiO films (NiO:Nb [7], NiO:N [18,19]) and the double doped NiO film (NiO:(Nb,N)). D = crystallite size,  $\epsilon_L$  = lattice strain, Egap = energy gap,  $E_U$  = Urbach energy.

Thin Films	Structural properties			Optical properties		
	(200) Peak position 2 $\theta$ (degree)	D (nm)	$\epsilon_L$ ( $\times 10^{-2}$ )	Direct Egap (eV)	Indirect Egap (eV)	$E_U$ (meV)
NiO	42.56	5.33	1.77	3.28	-	2,330
NiO:Nb	42.84	4.49	2.09	3.35	-	2,812
NiO:N	42.71	9.14	1.15	3.67	2.72	592
NiO:(Nb,N)	42.66	10.07	0.94	3.73	2.75	586



**Figure S1.** UV-Vis-NIR transmittance of the undoped NiO film, the single doped NiO films (NiO:Nb [7], NiO:N [18,19]) and the double doped NiO film (NiO:(Nb,N): (a) just after deposition (as-prepared) and (b) after thermal treatment (TT1=300°C, 15 min,  $N_2$ ).

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