Supporting Information

Excellent Anti-fogging Dye-sensitized Solar Cells Based On Superhydrophilic Nanoparticle Coatings

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Reflection from an optical interface is often undesirable because it reduces the performance of photovoltaic/photocatalytic devices. In this regard, anti-reflection (AR) coatings play a significant role in improving the efficiency of photovoltaic applications by enhancing the transmission of light into the active region of the photovoltaic devices. In air and normal incidence condition, the reflectance is minimized at targeted wavelength, λ_{min}, when the refractive index and thickness of the AR coating satisfy these relations:

$$n_c = (n_{air} \cdot n_{sub})^{1/2} \quad (1)$$

$$\lambda_{min} = 4\, n_c \cdot d \quad (2)$$

where n_c is the refractive index of AR coating materials (i.e., SiO_2 layer), n_{air} is the refractive index of ambient medium (i.e., air), n_{sub} is the refractive index of substrate (i.e., glass) and d is the thickness of the AR coating materials, respectively. Since the refractive indices of air and glass are about 1 and 1.56, respectively,[1] the optimum refractive index and thickness for AR coatings are n_c = 1.25 and d = 105 nm, respectively, for λ_{min} = 525 nm (reference wavelength for N719 dye-based DSSCs).

Reference

[1] K.T. Cook, K.E. Tettey, R.M. Bunch, D. Lee, A. J. Nolte, *ACS Appl. Mater. Interfaces* **2012**, *4*, 6426.