Supplementary information

The Effect of Alkali Metal (Na, K) Doping on Thermochromic Properties of VO2 Films

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Sample Characterisation

Scanning electron microscopy (SEM) investigations were carried out to analyse the crystallite surface structure of the synthesized coatings, by an *FEI Inspect F Field Emission SEM* at an accelerating voltage of 10 keV and spot size of 3 nm and a working distance of 10 mm. Prior to SEM measurements, samples were coated with a thin film of gold. *X*-ray diffraction (XRD) measurements were made on a *Panalytical X’Pert Pro* diffractometerfitted with an *X’Celerator* detector in glancing angle (α = 3°) mode, using Ni filtered Cu-Kα radiation (Kα1 = 1.5405980 Å and Kα2 = 1.5444260 Å). The diffraction patterns were collected over 2θ range 20–70° with a step size of 0.033° and an effective count time of 1.7 s per step. UV/vis/NIR transmission spectra was measured using a *Perkin-Elmer Lambda 950* UV–Vis–NIR spectrometer, in the range of 300–2500 nm with an air spectral background. In order to determine the thermochromic properties of the films, transmission was recorded above and below *T*c by heating the samples on a hot plate. Thermochromic properties of the films such as solar transmittance modulation (Δ*T*) and the critical transition temperature (*T*c) were measured by temperature-dependent UV-Vis-NIR spectroscopy. Hysteresis data were obtained for films by heating between *ca*. 20 °C and 80 °C, using a custom-built heated sample holder. Spectra were recorded at 5 °C intervals on heating and cooling. *T*c was measured as the mid-point of the hysteresis loop. The hysteresis loops were plotted at 2500 nm. X-Ray photoelectron spectroscopy was conducted on a *Thermo Scientific* *K-alpha* spectrometer with monochromated Al Kα radiation, a dual beam charge compensation system and constant pass energy of 50 eV (spot size 400 μm). Survey scans were collected in the binding energy range 0–1200 eV. High-resolution peaks were used for the principal peaks of V (2*p*), O (1*s*), Na (1*s*), K (2*p*), Cl (2*p*) and C (1*s*). Data was calibrated against C1*s* (285.0 eV). Data was fitted using CASA XPS software. Sample adhesion was tested using the standard Scotch tape test as well as attempted abrasion using tissue paper, and brass and steel styli.

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| **Figure S1**. The SEM side-on images of the a) undoped, b) Na and c) K doped VO2 films. |
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| **Figure S2**. The transition parameters for heating (black line) and cooling (red line) branches using the d(Tr)/d(Temp) vs Temperature plot for the a) undoped, b) Na and c) K doped VO2 films. FWHM denotes full width half maxima, calculated from the plot. |