Intelligent Thermochromic Coatings Grown by Chemical Vapor Deposition at Atmospheric Pressure

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Thermochromic materials, such as vanadium dioxide, have the ability to change from a semi-conductive to a metal state when their temperature reaches a specific value, which is called transition temperature (T_c). For the deposition of a thermochromic layer, many methods have been used such as magnetron sputtering, pulsed laser deposition, atomic layer deposition, sol-gel, spin coating etc. Nevertheless, a low cost method using non-toxic precursors and easily transferred to large scale is needed.

In this work, vanadium dioxide films were fabricated using a chemical vapor deposition at atmospheric pressure (APCVD) on fluorine doped tin dioxide pre-coated glass substrates using vanadyl (IV) acetylacetonate as vanadium precursor at 500 ^{o}C. The samples were characterized by X-ray diffraction, Raman spectroscopy, Scanning Electron Microscopy (SEM), UV-Vis-NIR spectroscopy measurements at temperatures below and above T_c as well as transmittance measurements as a function of temperature at an incident radiation of 1500 nm. The effect of oxygen flow rate through the reactor on the properties and the subsequent thermochromic characteristics of the samples is discussed.

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