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Effect of laser wavelength in PLD in the orientation and thermochromic properties of VO₂ (M1) on a glass substrate

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ABSTRACT:

Highly oriented VO₂ (M1) thin films are difficult to produce using non-crystalline substrates. For example, to produce such films on glass has required post-annealing or the use of a ZnO transparent layer. Here, we overcome this challenge and report highly oriented VO₂ (M1) in the (100) plane directly on the glass substrate by pulsed laser deposition (PLD). We study the influence of the laser wavelengths (1064, 532, 355 and 266 nm) on the orientation of VO₂ (M1) deposited on Corning glass. We find that the laser wavelength of 532 nm leads the most highly a-axis textured VO₂ (M1) demonstrating the highest reversible metal-to-insulator at about 62 °C with a lowest hysteresis width of approximately 9 °C. One of the conditions is to select the green 532 nm wavelength laser in PLD as this particular laser wavelength also produces films with highest roughness value (of more than 60 nm) when compared to other wavelengths which produce films of roughness values less than 40 nm.