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Revised manuscript

Low-temperature growth of VO_2 films on transparent ZnO/glass and Al-doped ZnO/glass and their optical transition properties

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Keywords: Vanadium dioxide (VO_2), Zinc oxide (ZnO), Low temperature growth, Al-doped ZnO, Optical properties

Abstract

Vanadium dioxide (VO_2) is a promising compound for thermochromic applications because of its insulator-metal transition (IMT) characteristic with concomitant transmittance change for infrared-light. For practical applications, we deposited VO_2 thin films on transparent ZnO films on glass substrate. Growth of (010)-oriented VO_2 film was obtained on c-axis oriented hexagonal ZnO layer, however, zinc vanadate ($Zn_2V_2O_7$) was formed at the interface region in conventional radio-frequency magnetron sputtering at substrate temperature of 350 °C. On the other hand, (010)-oriented VO_2 films were successfully grown on ZnO/glass substrates even at lower temperature of 250 °C by introducing inductively coupled plasma (ICP)-assisted sputtering, realizing steep interface between VO_2 and ZnO without undesirable compounds. The VO_2 films showed resistivity drop of more than two orders of