

Abstract Submitted
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Thermochromic characteristics of Ti-doped VO₂ thin film HWA-SOO LEE, KYUNG HYUN KO, JUN OH CHOI, Ajou Univ — Utilizing metal-to-insulator transition (MIT) properties of V-oxide film, stable VO₂ phase is necessary. In sputtering deposition of VO₂, simple target preparation and high deposition rate are recommendable. For this, VO₂ film was deposited on quartz substrate by RF magnetron sputter system under low working pressure using V₂O₅ target. Due to the lower sputtering yield of oxygen compared to vanadium, oxygen ion contents is usually deficient from that of target. So, the reduction of V ions was a result of charge compensation with the oxygen ions. Under lower working pressure, deposition rate become higher so that this deficiency is getting larger to cause further reduction to destabilize VO₂. Preventing this, titanium oxide co-deposition was suggested to enrich oxygen source. When TiO₂ was used, Ti ion has stable +4 charge state so that extra oxygen sputtered prevents V ion reduction below +4 state. But, in case of TiO, Ti ions were oxidized from +2 to +3 and +4 state and V ions with less oxidation potential should be reduced to +3 or so. Pure VO₂ film had MIT at 66°C and large resistivity ratio of 4 orders of magnitude from 30°C to 90°C. Under low working pressure, (V₂O₅ + TiO₂) system yield fairly good films, while films with poor or absence of MIT were produced with TiO case.

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