

Synthesis of high purity W-doped VO₂(M) in lower temperature condition for smart window application

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Vanadium dioxide(VO₂) is a representative thermochromic material that can be applied in optical switching devices and energy-saving smart window. Still many researcher have been carried out, VO₂ has problems to apply in smart window because of high synthetic temperature and low purity. It needs large amounts of heating energy to reach high calcination temperature of 800–900 oC so this process is economically infeasible. Also, generally other types of vanadium oxide impurities such as V₄O₉, V₆O₁₃ are contained in final products, which calcined in N₂ atmosphere.

In this study, we successfully prepared high purity W-doped VO₂ that is synthesized followed by calcination at low temperature near 550 °C under 5% H₂ atmosphere. The crystal structure is shown pure and intense VO₂(M) in XRD and the phase transition temperature peaks also are symmetric and strong around 40 °C. These results exhibit high purity of VO₂ and lower calcination temperature compared with those of calcination under N₂ atmosphere. Further characterizations were carried out using TEM, FE-SEM and XPS analysis.