

Reproducibility enhancement on synthesis of tungsten-doped vanadium dioxide particle

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Vanadium dioxide(VO_2) has attracted much attention because its semiconductor-to-metal(S-M) transition temperature(T_c) is near room temperature(68°C), which makes it useful for application to optical switching devices and intelligent energy conserving windows coating. The decrease of transition temperature can be attributed to tungsten-doped vanadium dioxide and induced by W atoms that leads to the loss of $\text{V}^{4+}-\text{V}^{4+}$ pairs and destabilizes the semiconductor phase and consequently lowers the S-M transition temperature. In synthesizing of W- VO_2 , the reaction can be occurred unexpectedly at room temperature because VO_2 have various valence numbers such as V^{5+} , V^{4+} , V^{3+} and V^{2+} . We investigated to prepare W- VO_2 particle at low reaction temperature(10°C) in order to reproductive synthesis. The transition temperatures are appeared mostly at similar temperature repeatedly. XRD patterns indicated that all W-doped VO_2 particles were monoclinic crystals. DSC analyses displayed that W-doped VO_2 particles had good phase transition characteristic around 40°C . For further characterization, TEM, FE-SEM and XPS analysis were done.