

Supplementary information for

Influence of low Bi contents on phase transformation properties of VO₂ studied in a VO₂:Bi thin film library

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1. Variation of thickness in the VO₂:Bi thin film library

Fig. S1 indicates the thickness of VO₂:Bi thin film at different MAs. The thickness changes from 206 nm at V-rich side to 77 nm at Bi-rich side. The change of thickness along the library can be fitted with a linear relation.

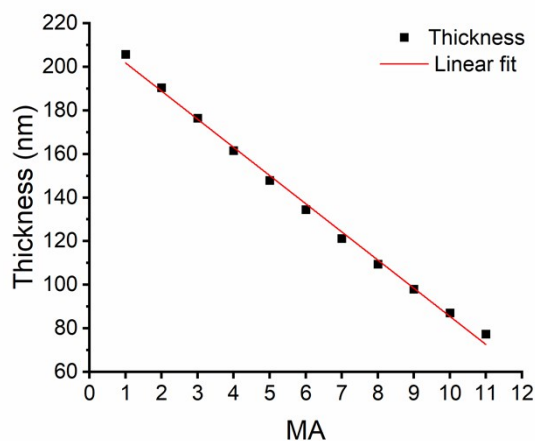


Fig. S1 thickness of the VO₂:Bi thin film at different MAs. Red line corresponds to a linear fit.

2. XRD peak analysis

The peak at (011) was analysed in detail by fitting it with a Gaussian function. The peak position and width (FWHM) were plotted versus Bi content, as shown in Fig. S2.

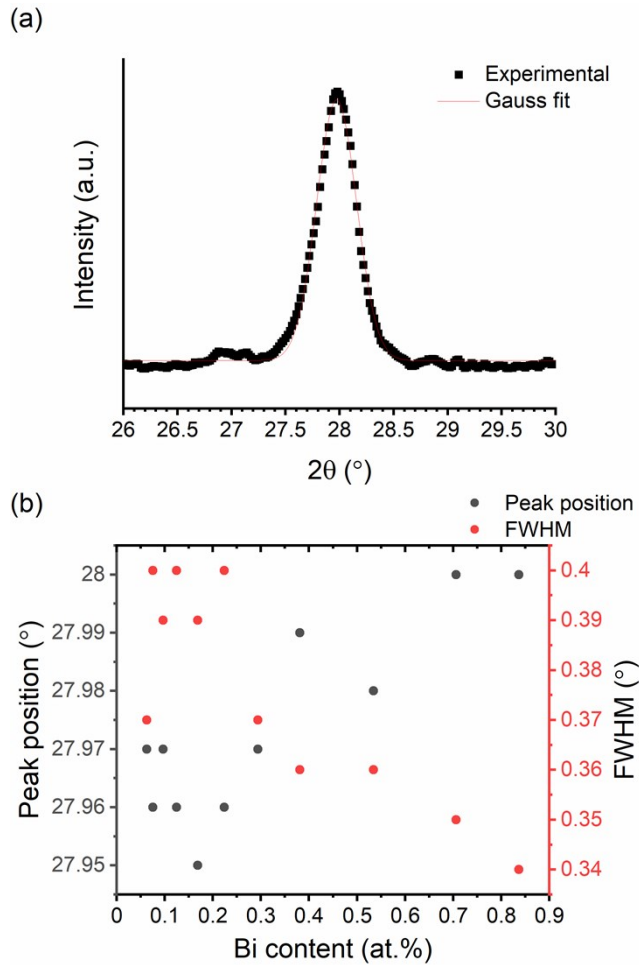


Fig. S2 (a) Gaussian fit of the (011) peak of 0.06 at.% Bi-VO₂ as an example. (b) Peak position and width (FWHM) for thin films with different Bi content.

Although a slight peak shift of $\sim 0.01^\circ$ is observed in the fitted peak position, it has to be noticed that the collected XRD raw data points were 0.02° apart. The overall (011) peak position of the VO₂:Bi thin film is about $27.98 \pm 0.02^\circ$, except one peak at 27.95° . With more Bi content, the peak position seems to increase slightly. Concerning the peak shape, the thin film with higher content of Bi seems to be narrower with slightly smaller FWHM.

3. Temperature-dependent resistivity

Fig. S3a shows the resistivity of VO₂:Bi thin film library of different Bi content at 40 °C and 100 °C. The addition of Bi seems not to change the resistivity of semiconductor VO₂. In comparison, the resistivity of metallic VO₂ shows a tendency of increasing in Bi content range of 0.08-0.29 at.%. Although the second phase BiVO₄ has much higher resistivity (~108 Ω cm), its presence didn't elevate the overall resistivity of the VO₂:Bi library, probably due to its low amount. In addition, the tendency of resistivity change of metallic VO₂:Bi thin film along the increasing Bi content is coincident with the change of T_c as shown in Fig. S3b.

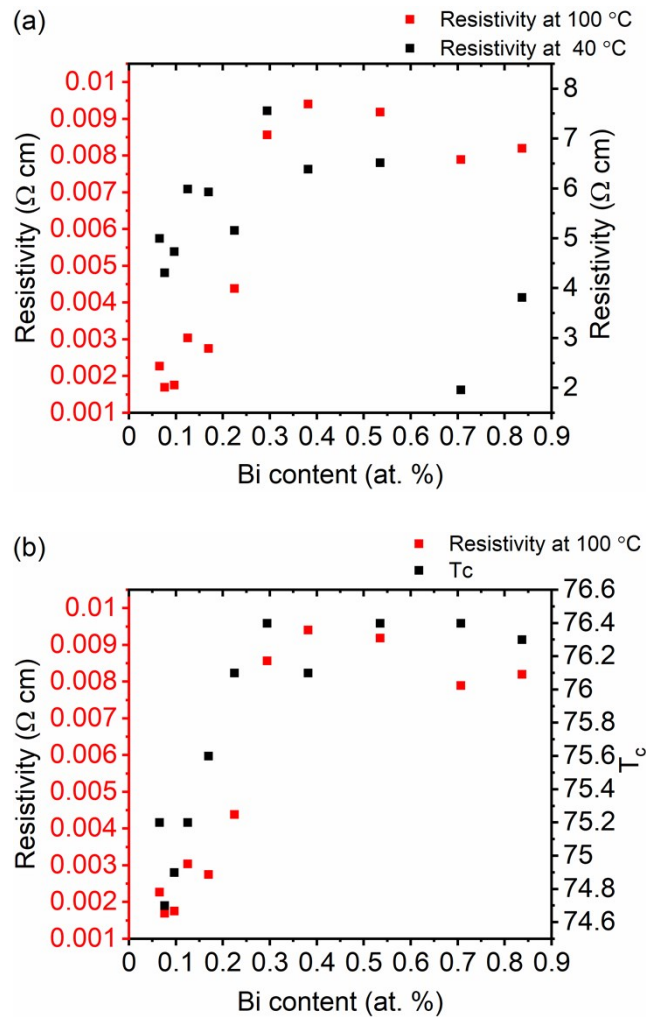


Fig. S3 (a) Resistivity of the VO₂:Bi thin film library of different Bi content at 40 °C and 100 °C. (b) The T_c and resistivity at 100 °C for thin film of different Bi content