

High resolution angle-resolved photoemission study of SrVO<sub>3</sub> thin films

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**Introduction**

Light transition-metal oxides (TMO's) such as perovskite-type Ti and V oxides are ideal systems to study the fundamental physics of electron correlation because they are prototypical Mott-Hubbard-type systems. To address the nature of electron correlation in light TMO's, photoemission spectroscopy measurement has provided rich information [1]. The V3d band dispersion and the Fermi surfaces of the three-dimensional Mott-Hubbard system SrVO<sub>3</sub> have been directly observed by angle-resolved photoemission spectroscopy (ARPES) [2]. Takizawa *et al.* have fabricated SrVO<sub>3</sub> thin films having atomically flat surfaces using the pulsed laser deposition (PLD) technique and studied its detailed electronic structure by *in-situ* ARPES measurements. Clear band dispersion not only in the coherent quasi-particle part but also in the incoherent part has been observed [3].

**Experimental condition**

We have performed a detailed ARPES study of *in-situ* prepared SrVO<sub>3</sub> thin films which have well-defined atomically flat surfaces. This ARPES experiments were carried out using a SES-2002 analyzer at BL-28A. The energy and momentum resolution was at 18 meV and ~0.5 deg, respectively. Measurements were performed at 15 K.

**Results and Discussion**

We have observed a sharp V3d band dispersion near Fermi level ( $E_F$ ). The band dispersion measured at photon energy  $h\nu = 74\text{eV}$  is shown in Fig.1(a). Real part of self-energy shown in Fig. 1(c) was obtained by assuming LDA band as a bare band as shown in panel (b). "Kink" has been observed at low binding energy region (~ 60 meV) as in the case of high- $T_c$  cuprate superconductors. This effect may be attributed to electron-phonon coupling, judging from the energy at which the kink has been observed. Moreover, a "high energy kink" has also been observed around 0.3eV below  $E_F$ .

**Conclusion**

We have performed ARPES studies of SrVO<sub>3</sub> thin films. Kink has been observed at ~ 60 meV in SrVO<sub>3</sub>,

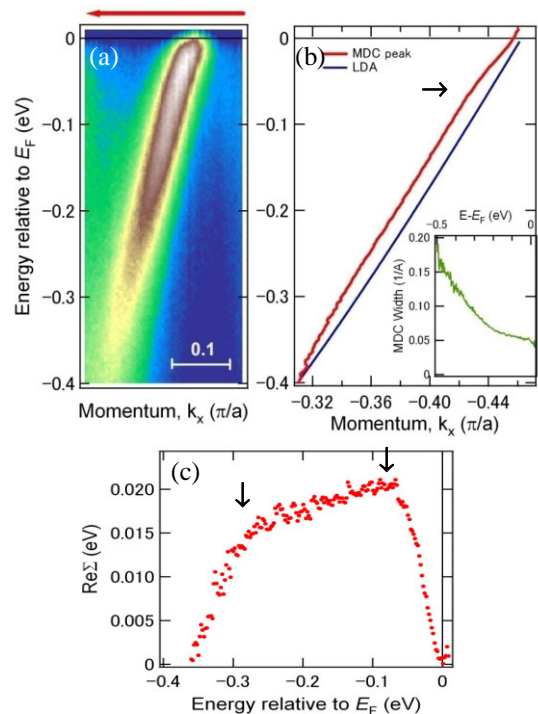


Fig.1 Quasi-particle dispersion of SrVO<sub>3</sub> along (0,0) to (0, $\pi$ ) direction. (a) ARPES intensity as a function of energy and momentum. (b) Dispersion extracted from (a) by fitting MDCs. The inset shows the corresponding MDC width (FWHM). (c) Real part of electron self-energy. Arrows indicate fine features at ~ 60 meV and ~ 0.3 eV.

possibly due to the electron-phonon interaction similar to the case of the high- $T_c$  cuprates. "High energy kink" may be present around 0.3eV below  $E_F$ .

**References**

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