Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary Information

For VB XPS spectra comparison 10 nm thermal-ALD Ta_2O_5 films were also grown via the $Ta(OC_2H_5)_5/H_2O$ process, at the same substrate temperature on the same substrates. VB XPS spectra of active H* assisted ALD TaO_x and thermal-ALD Ta_2O_5 films are Figure1(Supplementary Information).

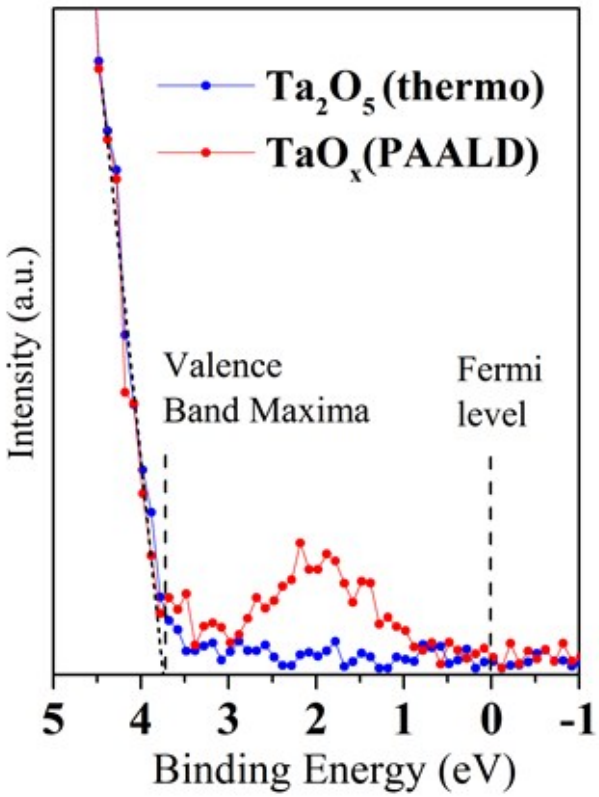

Figure 1 Valence band XPS spectra measured from 10 nm PAALD TaOx *(t_{pl}* = 20sec*, R* = 7% *and* t_{pr}= 0.5 sec and 10 nm thermal ALD Ta_2O_5 films.

It can be seen that thermal ALD Ta_2O_5 film revealed no electronic states at the energies higher than VBM. In other words, there no defect states in the band gap in the stoichiometric thermal-ALD Ta_2O_5 film. In contrast, a peak at ~ 1.8 eV higher than VBM is clearly distinguishable at the VB spectrum of PAALD TaOx film.