

Abstract Submitted  
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**Real-space observation of metal-insulator transition at complex oxide heterointerface with cross-sectional STM** YA-PING CHIU<sup>1</sup>, National Taiwan Normal University, Taiwan, JHENG-CYUAN LIN, Academia Sinica, Taiwan, TRA-VU THANH, National Chiao Tung University, Taiwan, TAI-TE LIN, PO-CHENG HUANG, National Sun Yat-sen University, Taiwan, BO-CHAO HUANG, Academia Sinica, Taiwan, JIUNN-YUAN LIN, YING-HAO CHU<sup>2</sup>, National Chiao Tung University, Taiwan — We report the direct observation of tunable electronic property through visible light at  $LaAlO_3/SrTiO_3$  (LAO/STO) complex oxide heterointerface using cross-sectional scanning tunneling microscopy and spectroscopy (XSTM/S). Many researches have shown that for the interface to be conducting, the thickness of LAO should be equal to or greater than the critical value 4 unit cells (u.c.). With LAO surface modification by Au clusters, interfacial two-dimensional electron gas presents a giant optical switching effect under visible light illuminated. In this study, through the interaction between photons and electrons system, a direct observation of the evolution of electronic structures from insulating to conducting has been revealed in the LAO (3u.c.)/STO model using the technique of cross-sectional scanning tunneling microscopy and spectroscopy. Results clearly reveal the changes in the built-in electric field in LAO and the band bending in the STO adjacent to the interface after light illumination.

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