Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Designing antiphase domain boundary by atomic controlled heterointerfaces[1] HANGWEN GUO, ZHEN WANG, MOHAMMAD SAGHAYEZHIAN, Louisiana State University, JING TAO, Brookhaven National Laboratory, ANTONIO VECCHIONE, National Research Council, Institute of Applied Science Intelligent Systems (ISASI) E. Caianiello, YIMEI ZHU, Brookhaven National Laboratory, JIANDI ZHANG, E. WARD PLUMMER, Louisiana State University — Domain boundaries are one of the most commonly observed phenomena in crystal and thin film growth. They often show random formation by nature but can have large impact on physical properties. So far, there are very limited examples to exhibit designable domain boundary arrangement. In this work, we employed a methodology to control the nucleation and growth of antiphase boundary (APB), by growing thin film oxides on top of freshly cleaved layered compound. At the cleaved surface, the step of two adjunct terraces serves a natural seeding bed to nucleate APB. Utilizing high resolution scanning transmission electron microscopy (STEM), we directly visualized that APBs can merge into pyramid-like shape when two steps are close. Our observation opens up a new route to design and control domain boundaries in thin film transition metal oxides.

[1]Supported by U.S. DOE under Grant No. DOE DE-SC0002136.

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Date submitted: 20 Nov 2016 Electronic form version 1.4