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**Oxygen Motion and Electroresistance Observed in a Bilayer Manganite** BENJAMIN BRYANT, GABRIEL AEPPLI, London Centre for Nanotechnology, University College London, CHRISTOPH RENNER, Department of Condensed Matter Physics, University of Geneva, YUSUKE TOKUNAGA, Multiferroic Project, ERATO, Japan Science and Technology Agency, Wako, YOSHINORI TOKURA, Department of Applied Physics, University of Tokyo — Oxygen defects and migration are thought to play key roles in electroresistive oxide devices[1,2]. Scanning Tunnelling Microscopy (STM) can be used to study the dynamics of individual oxygen adatoms and vacancies at the oxide surface. We have identified a material, $PrSr_2Mn_2O_7$ which is suitable for STM study and also displays room temperature electroresistance. We have observed surface oxygen adatoms and vacancies in atomic-resolution STM images and tunnelling spectra. Time dependent STM imaging shows the dynamics of adatoms and vacancies, including adatom hopping and vacancy-adatom recombination. Bistable current-voltage characteristics are found for single oxygen adatoms. We suggest that the bulk material may be modelled as a network of electroresistive junctions.

[1]Nian, Y. B. et. al., Physical Review Letters 98, 146403 (2007).
[2]Shono, K. et. al., Applied Physics Express 1, 055002 (2008).

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