

Abstract Submitted
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Molecular dynamics simulations of oxide memory resistors (memristors) ALEXANDER BRATKOVSKY, Hewlett-Packard Laboratories, Palo Alto, S.E. SAVELIEV, A.S. ALEXANDROV, Loughborough U, UK, R.S. WILLIAMS, Hewlett-Packard Laboratories, Palo Alto — Reversible bipolar nano-switches that can be set and read electronically in a solid-state two-terminal device are very promising for applications. We have performed molecular-dynamics simulations that mimic systems with oxygen vacancies interacting via realistic potentials and driven by an external bias voltage. The competing short- and long-range interactions among charged mobile vacancies lead to density fluctuations and short-range ordering, while illustrating some aspects of observed experimental behavior, such as memristor polarity inversion. The simulations show that the “localized conductive filaments” and “uniform push/pull” models for memristive switching are actually two extremes of one stochastic mechanism [1].

[1] S. E. Savel'ev, A. S. Alexandrov, A. M. Bratkovsky, R. Stanley Williams, arXiv:1010.5656v1

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