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Atomistic-Scale Mechanism of Electrical Dipole Switching in Phosphosilicate Glass ZHI SONG, XIAO SHEN, University of Memphis — Non-volatile memories based on the switching of electrical polarization in ferroelectric materials are among the candidates for future information storage. However, the fabrication of devices using typical ferroelectric materials requires exotic substrates and thus is incompatible with standard CMOS technology. Certain glassy materials such as phosphosilicate glass (PSG) are known to exhibit switchable electrical polarization similar to ferroelectric materials, while can be fabricated from thermal SiO2 on a standard wafer. However, the underlying mechanism of the switching of polarization in PSG is yet to be understood. Here we present results from first-principles calculations unveiling the atomistic-scale mechanism of electrical dipole switching in PSG. The results also provide guidance to enhance the switching speed and retention time.

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