Time-dependent Thermoelectric Switching in Vanadium Oxide

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Abstract

We report the reversible thermoelectric switching [1, 2, 3] induced by a time dependent and frequency domain electric field (or AC voltage) in a microscopic single contact nano-device based on Gold and Vanadium Oxide, which promises potential applications for future information storage and processing [4, 5, 6]. We study the electronic transport mechanism using COMSOL Multiphyshics , using Thermoelectric modules and electrical current module. Which demonstrate that electronic transport channels are formed by a conductive filament [1-7]. For systematical optimization, the Optimization and Sensitivity Module was used. We also show that metal-insulator transitions can be manipulated in order to obtain thermoelectric resonance that can by used as a new resistive switching mechanism. We study the ionic migration by multi-physics phenomena, and his role to create polarization on our switching.

Reference

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Figures used in the abstract

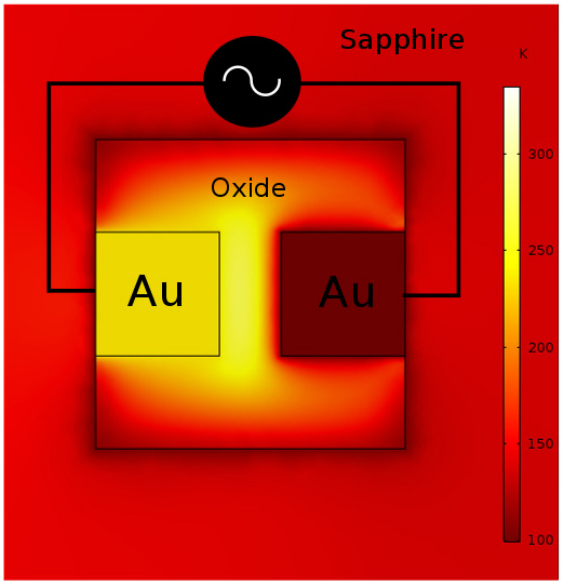

Figure 1: Thermoelectric switching in Al2O3/Oxide susbstrate with Au metallic contact. Metal-Insulator transition induced by AC voltage Signal.