

Nanoscale thermal mapping of electronic devices

Miguel Muñoz Rojo
ICMM-CSIC, Spain

m.m.rojo@csic.es

One of the greatest challenges of modern society is related to energy consumption, dissipation and waste. A prominent example is that of integrated electronics, where power dissipation issues have become one of its greatest challenges. In this talk, I will discuss how to characterize energy dissipation in electronics, like heating in transistors based on 2D materials or in the conductive filaments of resistive random-access memories (RRAM), using spatially resolved thermometry. As the size of materials and devices shrinks to nanometer, atomic, or even quantum scale, it is more challenging to characterize their thermal properties reliably. Scanning thermal microscopy (SThM) is an emerging method to obtain local thermal information of electronic devices by controlling and monitoring probe-sample thermal exchange processes. Gaining thermal insights of our electronics is essential to design energy efficient circuits and understand and optimize ultra-dense data storage.

Figures

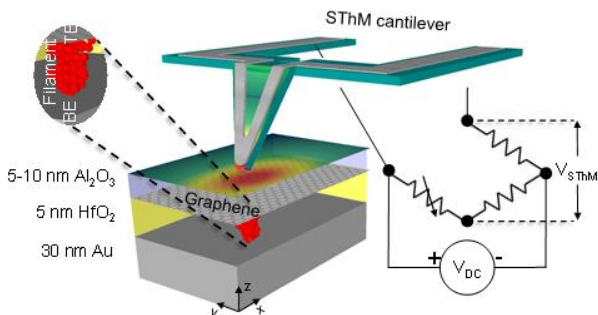


Figure 1. Thermal measurements of conductive filaments in RRAM memory devices