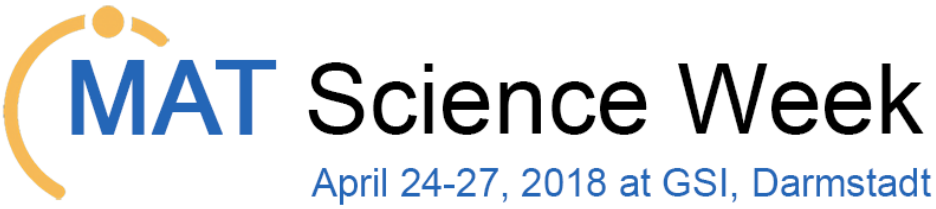

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Heavy Ion Radiation Effects on Hafnium Oxide based Resistive Random Access Memory

Friday, 27 April 2018 10:50 (20 minutes)

Classical FLASH technology shows limited radiation tolerance making it sensible to radiation induced errors, e.g., single event upsets. Charge based memories are becoming more and more sensitive to radiation with further downscaling leading to a lack of radiation hard memories beyond Mbit storage capacities. There is, thus, great demand for new intrinsically radiation hard NVM technologies. Since the storage of information in Resistive Random Access Memory (RRAM) is ascribed to a conductive filament of oxygen vacancies, the information is not based on charge but on a physical microstructure related state within the device, providing high resistance towards ionizing radiation, as shown for high energy protons, γ-radiation and X-ray-radiation. This makes RRAM based on hafnium oxide interesting for applications in harsh environments, such as energy plants or (aero) space applications. For such applications, the effect of heavy ion radiation on the switching behaviour needs to be investigated.
Therefore, hafnium oxide based RRAM (TiN/HfOx/Pt/Au) stacks[1] were irradiated with 1.1 GeV Au-ions with fluences up to 10^12 ions/cm^2 and evaluated regarding pristine resistance, forming voltage, and data retention.
[1] S. U. Sharath, Adv. Funct. Mater. 27, 1700432 (2017)

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