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**Effect of Temperature and Spin Torque on the Stoner-Wohlfarth Astroid of a Nanomagnet** YU-JIN CHEN, University of California, Irvine, JORDAN KATINE, Hitachi Global Storage Technologies, JUERGEN LANGER, Singulus Technologies, MARK LEWIS, University of California, Los Angeles, GRAHAM ROWLANDS, JIAN ZHU, University of California, Irvine, PEDRAM KHALILI AMIRI, KANG WANG, University of California, Los Angeles, ILYA KRIVOROTOV, University of California, Irvine — We report measurements of the Stoner-Wohlfarth switching astroid curves of the free layer nanomagnet in CoFeB/MgO/CoFeB/Ru/CoFe/PtMn elliptical nanoscale magnetic tunnel junctions made as a function of applied voltage and temperature. Measurements of the astroid area as a function of temperature allow us to determine the magnetic anisotropy energy barrier of the free layer and thereby quantify its thermal stability - an important performance parameter of spin torque nonvolatile magnetic memory. Measurements of the astroid as a function of voltage (V) applied to the junction at the bath temperature of 4 K reveal significant voltage-induced deformations of the astroid curve. We observe a decrease of the hard-axis length of the astroid, which arises from ohmic heating of the junction. Comparison of the hard-axis astroid length measured at T = 4 K and —V— ¿ 0 to the hard-axis astroid length measured at T ¿ 4 K and V = 0 allows us to quantify ohmic heating of nanoscale tunnel junctions by the applied voltage. The applied voltage reduces the easy-axis length of the astroid as well, but the reduction is asymmetric for positive and negative easy-axis directions. This easy-axis asymmetry reverses upon the applied voltage sign reversal and thus it can be attributed to spin transfer torque.

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