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Minimization of the energy costs for operating magnetic tunnel junctions[1] ILYAS A. H. FARHAT, E. GALE, Khalifa University - KUSTAR, A. F. ISAKOVIC, Khalifa University - KUSTAR, KSRC — Increasing prospects of utilizing the STT-MRAM calls for the re-assessment of the overall energy (power) cost of operating magnetic tunnel junctions and related elements. This motivates our design, nanofabrication and characterization of simple tri-layer magnetic tunnel junctions which show measurable decrease in the operating energy cost. The MTJs we report about rely on nanoengineering interfaces between the insulating and magnetic layers in such a way that the area of the hysteresis loops can be controlled in one or both magnetic layers. Our TMR coefficient ranges from 45% to 130%, depending on the MTJ layer materials, and can be anticipated to be further increased. We also report the study of the TMR dependence on the RA product, as an important interface parameter. Lastly, we present an analysis of MTJ parameters affected by our approach and a perspective on further improvements, focusing on the device design parameters relevant for the integration of this type of MTJs.

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