

Ultra-Fast Perpendicular Spin-Orbit Torque MRAM

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Abstract

© 1965-2012 IEEE. We demonstrate ultra-fast (down to 400 ps) bipolar magnetization switching of a three-terminal perpendicular Ta/FeCoB/MgO/FeCoB magnetic tunnel junction. The critical current density rises significantly as the current pulse shortens below 10 ns, which translates into a minimum in the write energy in the nanosecond range. Our results show that spin-orbit torque-MRAM allows for fast and low-power write operations, which makes it promising for non-volatile cache memory applications.

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Keywords

Cache memory, MRAM, spin transfer, spin transfer torque-magnetic random access memory (STT-MRAM), spin-orbit torque, spin-orbit torque-MRAM (SOT-MRAM), spintronics

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