



Spin-Orbit Torque Magnetoresistive Random Access Memory With Magnetic Field-Free Current-Induced Perpendicular Magnetization Reversal

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Inventors: Jiamian Hu, Minyi Dai

The Invention

Spin-orbit torque magnetoresistive random-access memory (SOT-MRAM) cells that undergo perpendicular magnetization switching in the absence of an in-plane magnetic field and methods for their operation are provided. The SOT-MRAM cells use cobalt-iron-boron alloys, cobalt-iron alloys, metallic cobalt, and/or metallic iron as the ferromagnetic free layer in a magnetic tunnel junction. By designing the ferromagnetic layer with appropriate lateral dimensions and operating the SOT-MRAM cells with an appropriate charge current density, deterministic perpendicular magnetization switching is achieved without the need to apply an external in-plane bias collinear with the charge current.

Additional Information

For More Information About the Inventors

- [Jiamian Hu](#)

Publications

- [Dai M. and Hu J. 2020. Field-Free Spin–Orbit Torque Perpendicular Magnetization Switching in Ultrathin Nanostructures. *npj Computational Materials*. 6, 78.](#)

Tech Fields

- [Information Technology : Hardware](#)

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