Any time
Since 2025
Since 2024
Since 2021
Custom range...

Sort by relevance
Sort by date

Any type
Review articles

include patents
include citations

Giant tunnelling magnetoresistance at room temperature with MgO (100) tunnel barriers

[PDF] academia.edu

SSP Parkin, C Kaiser, A Panchula, PM Rice, B Hughes, M Samant, SH Yang

Nature materials, 2004 • nature.com

Abstract

Magnetically engineered magnetic tunnel junctions (MTJs) show promise as non-volatile storage cells in high-performance solid-state magnetic random access memories (MRAM). The performance of these devices is currently limited by the modest (<~70%) room-temperature tunnelling magnetoresistance (TMR) of technologically relevant MTJs. Much higher TMR values have been theoretically predicted for perfectly ordered (100) oriented single-crystalline Fe/MgO/Fe MTJs. Here we show that sputter-deposited polycrystalline MTJs grown on an amorphous underlayer, but with highly oriented (100) MgO tunnel barriers and CoFe electrodes, exhibit TMR values of up to ~220% at room temperature and ~300% at low temperatures. Consistent with these high TMR values, superconducting tunnelling spectroscopy experiments indicate that the tunnelling current has a very high spin polarization of ~85%, which rivals that previously observed only using half-metallic ferromagnets. Such high values of spin polarization and TMR in readily manufactureable and highly thermally stable devices (up to 400 °C) will accelerate the development of new families of spintronic devices.

nature.com

SHOW LESS

☆ Save 99 Cite Cited by 4200 Related articles All 13 versions

Showing the best result for this search. See all results