

Abstract Submitted
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Self-Organized Defects of Half-Metallic Nanowires in MgO-Based Magnetic Tunnel Junctions MASAYOSHI SEIKE, TETSUYA FUKUSHIMA, KAZUNORI SATO, HIROSHI KATAYAMA-YOSHIDA, Grad. School of Eng. Sci., Osaka Univ. — The purpose of this study is to examine the possibility of self-organization of defects and defect-induced properties in MgO-based magnetic tunnel junctions (MTJs). Using the Heyd-Scuseria-Ernzerhof (HSE06) hybrid functional, first-principles calculations were performed to estimate the electronic structures and total energies of MgO with various defects. From our thorough evaluation of the calculated results and previously reported experimental data, we propose that self-organized half-metallic nanowires of magnesium vacancies can be formed in MgO-based MTJs. This self-organization may provide the foundation for a comprehensive understanding of the conductivity, tunnel barriers and quantum oscillations of MgO-based MTJs. Further experimental verification is needed before firm conclusions can be drawn.

References:

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