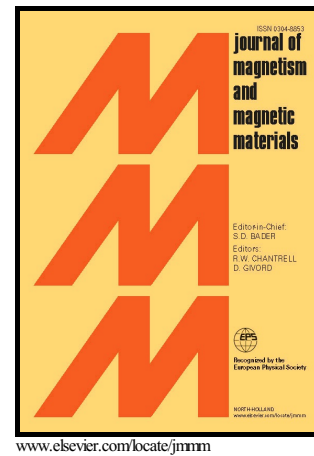


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PII: S0304-8853(16)32341-1
DOI: <http://dx.doi.org/10.1016/j.jmmm.2016.12.034>
Reference: MAGMA62242

To appear in: *Journal of Magnetism and Magnetic Materials*

Received date: 25 September 2016
Revised date: 9 December 2016
Accepted date: 14 December 2016

Cite this article as: Ru-shuai Han, Li-qian Qi, Li-hu Liu, Qin Xu, Ge-Xin Guo and Hui-yuan Sun, Microstructures and room temperature ferromagnetism of ordered porous ZrO₂ thin films sputter deposited onto porous anodic alumina substrates, *Journal of Magnetism and Magnetic Materials* <http://dx.doi.org/10.1016/j.jmmm.2016.12.034>

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Abstract

Ordered porous ZrO₂ films with pore diameters in the 5 ~ 45 nm range have been prepared on porous anodic alumina substrates using DC-reactive magnetron sputtering of pure Zr targets. A saturation magnetization (M_S) value as high as 119 emu/cm³ was obtained for the ZrO₂ film with pores of 45 nm in diameter when the external field was perpendicular to the film surface. The significant out-of-plane saturation magnetization is associated with the porous structure of the film. Experimental and theoretical results showed that the origin of the room temperature ferromagnetism (RTFM) is closely related to the ordered porous structure and the single charged oxygen vacancies of the films. These findings suggest that porous ZrO₂ films are promising to be applied to the spin electronic devices.

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