

Room-temperature ferromagnetism in cerium dioxide powders

Rakhmatullin R., Pavlov V., Semashko V., Korableva S.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015, Pleiades Publishing, Inc. Room-temperature ferromagnetism is detected in a CeO₂ powder with a grain size of about 35 nm and a low (<0.1 at %) manganese and iron content. The ferromagnetism in a CeO₂ sample with a submicron crystallite size and the same manganese and iron impurity content is lower than in the nanocrystalline sample by an order of magnitude. Apart from ferromagnetism, both samples exhibit EPR spectra of localized paramagnetic centers, the concentration of which is lower than 0.01 at %. A comparative analysis of these results shows that the F-center exchange (FCE) mechanism cannot cause ferromagnetism. This conclusion agrees with the charge-transfer ferromagnetism model proposed recently.

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