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## ABSTRACT

A paramagnetic-ferromagnetic transition was observed in normal spinel zinc ferrite ( $\text{ZnFe}_2\text{O}_4$ ) during atomic hydrogenation at room temperature. Magnetic measurements showed enhanced ferromagnetic property with increasing hydrogenation time. The hydrogenated  $\text{ZnFe}_2\text{O}_4$  has normal spinel structure according to the X-ray diffraction (XRD) and Raman analyses. Iron hydride was found from the XRD and X-ray absorption fine structure results. No A-B site ions exchange was observed in the x-ray absorption spectra while the atomic distances of Fe-O, Zn-O, Fe-Fe, Zn-Zn and Fe-Zn coordination were reduced. A hybrid of  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  in

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