Dynamics of Spin Glass in NiFe$_2$O$_4$Nanoparticle Y. YING, T. W. EOM, J. M. KIM, Y. P. LEE, Hanyang University, Korea, J. H. KANG, Kookmin University, Korea — The dynamic magnetic properties of spin glass in NiFe$_2$O$_4$ nanoparticles have been investigated. The strong irreversibility in the zero-field-cooled and the field-cooled temperature-dependent magnetizations implies the spin glass. The real part of the ac susceptibility$\chi'(T)$ curve shows a pronounced peak. With increasing frequency, the peak (T_f) shifts to a higher temperature, which is a characteristic of spin glass. The frequency-dependent T_f data is fitted by a critical power law: $\tau = \tau_0(T_f/T_g - 1)^{-zv}$. The spin-glass transition temperatureT_g is 290 K. The microscopic flipping time τ_0 of the fluctuating spins and the critical parameter zv are obtained to be 10^{-10} s and 8.3 respectively. They are both within the ranges typical for spin glasses (10^{-10} - 10^{-12}s for τ_0 and 5 - 10 for zv), confirming the nature of spin glass. The excellent fit by the Vogel-Fulcher model, revealing the existence of the inter-particle interaction, exhibits that spin glass rather than superparamagentism exists in NiFe$_2$O$_4$ nanoparticles.

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