Antiferromagnetic spin fluctuations and $s_{\pm}$-wave Superconductivity in $(Ca_4Al_2O_{6-y})(Fe_2As_2)$ probed by ^{75}As NQR

H. Kinouchi[a], H. Mukuda[a], M. Yashima[a], Y. Kitaoka[a], P. M. Shirage[b], H. Kito[b], H. Eisaki[b], and A. Iyo[b]

[a]Graduate School of Engineering Science, Osaka University, Osaka, Japan
[b]National Institute of Advanced Industrial Science and Technology, Ibaraki, Japan

We report ^{75}As-nuclear quadrupole resonance (NQR) study on $(Ca_4Al_2O_{6-y})(Fe_2As_2)$ with $T_c = 27$ K, which is characterized by structural parameters such as short a-axis length, high pnictgen height, narrow As-Fe-As angle, and thick perovskite-type blocking layer[1]. A measurement of nuclear spin relaxation rate $1/T_1$ revealed a significant evolution of antiferromagnetic (AFM) spin fluctuations in normal state, which originates from the possible well nested hole and electron Fermi surfaces. Below T_c, the $1/T_1$ decreases steeply upon cooling without any trace of Hebel-Slichter peak, which is consistently accounted for within the framework of $s_{\pm}$-wave multiple gap model as well as in other Fe-pnictide superconductors[2]. Even though AFM spin fluctuations are more significant than in optimally-doped $LaFeAsO_{1-y}$(T_c=28 K), T_c is comparable between these compounds, suggesting that the AFM spin fluctuations are not an unique factor to enhance T_c among the Fe-pnictide superconductors.

[1]P. M. Shirage *etal.*, Appl. Phys. Lett. **97**, 172506(2010).
[2]M. Yashima *etal.*, J. Phys. Soc. Jpn. **78**, 103702(2009)