2D ^{29}Si{^{1}H} heteronuclear correlation NMR studies of sorption site in Magnesium Silicate Hydrate

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Cementitious materials are installed as engineered barrier in low level radioactive waste disposal facility in Japan. There is no doubt that Calcium Silicate Hydrate (C-S-H) is one of most important elements in cementitious materials as a adsorption site for radioactive nuclides. However, it is pointed out that Magnesium Silicate Hydrate (M-S-H) , which is generated in cementitious materials due to existence of Mg contained in mineral admixtures or underground water, also can be the adsorption site. To clarify the mechanisms of adsorption mechanisms of between radioactive nuclide and M-S-H are important to evaluate long-term reliability as engineered barrier. 2D ^{29}Si{^{1}H} heteronuclear correlation solid state NMR is performed to understand the adsorption mechanism of M-S-H in this study. The spectrum of synthesized M-S-H (Fig.1) shows chemical environment of ^{29}Si and ^{1}H[1]. ^{1}H in M-S-H shows two types of chemical environment, one is -OH group bonding to Si which can be adsorption site and the other is H_2O which can not be the site. The intensity of signal belonging -OH group is much higher than previous study about C-S-H. It shows that M-S-H will adsorb more radioactive nuclides than C-S-H.

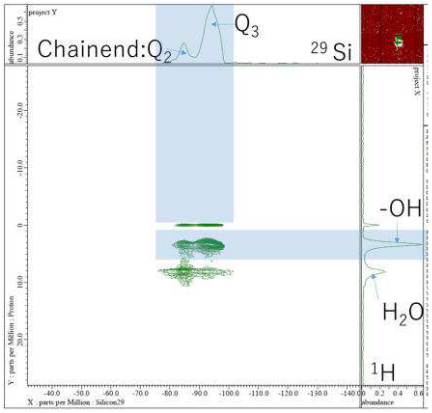

Fig.1 2D ^{29}Si{^{1}H} heteronuclear correlation solid state NMR spectrum of synthesized M-S-H

[1] Dominik Nied, *et al.*(2016), Properties of magnesium silicate hydrates (M-S-H), Cement and Concrete Research, Volume 79, pp. 323-332