Intepretation of Cs adsorption behavior based on the EXAFS, TR-DXAFS, and STXM methods

TSUYOSHI YAITA

Japan Atomic Energy Agency, 1-1-1 Koto, Sayo-cho, Sayo-gun, Hyogo 670-5148, Japan

Radioactive cesium in Fukushima has brought serious problem on our daily life since the nuclear reactor accident. Thus, verification test of decontaination of radioactive cesium has been widely carried out in Fukushima. Although this test is usually performed based on the pre-test in laboratory, radioactive cesium, however, was not sometimes able to removed from clay minerals even if used the same method. Based on this backgrounds, we first tried to clarify the adsorption mechanism on clay mineral in detail through the speciation of cesium using the advanced analytical methods such as the synchrotron based EXAFS, TR (time resolved)-DXAFS (SPring-8), STXM (ALS). Afterwards, we attempted identification of a specific adsorption site in clay minerals.

The adsorbent clay minerals were adopted vermiculite delivered from Fukushima and prepared by adsorption/desprption experiments of stable cesium in laboratory.

Figure 1 shows the time dependent radial structural function of EXAFS by TR-DXAFS. The structural differencies dependent on time were able to classified into four processes as follows, 1) diffusion of hydrated cesium in frayed edge site, 2) dehaydration, 3) adsoption on clay mineral, 4) closing of frayed edge site and fixing cesium on clay mineral site. In this presentation, we will talk about interpretation regarding the adsorption model based on the these results.

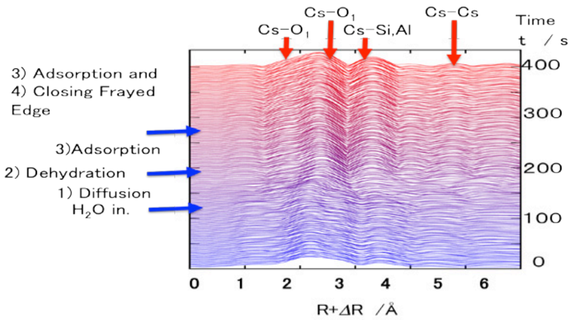

Figure 1: Time resolved radial structural functions of EXAFS for clay mineral-Cs-H_2O system. * Arrows in blue mean changing points of spectral features.

Oxygen isotopes as an indicator of corundums origin

[1]V. V. YAKOVENKO [2] S. V. VYSOTSKY[3] AND A. V. IGNAT'EV

[1]Far East Geological Institute, Far East Branch, Russian Academy of Sciences, Vladivostok, Russia(yakovenko_v.v@mail.ru)

Jewelry corundums have different origins [1]. The purpose of this study was to show dependence of oxygen isotope composition in corundum from genesis. Samples from various fields of the world were studied. The obtained isotope data testify that all studied Corundum-bearing Ural pegmatites showed range from $4.6 < \delta 18O < 6.5$ ‰. At the same time corundum from pegmatites of the Tazheransky massif showed values within range from $10.6 < \delta 18O < 11.9$ ‰. Corundum from plagioclasites in the ultramain breeds Tanzania, Polar Ural Mountains and Gvineniya keeps wiethin range from 4.8‰ <δ18O<5.5‰.Biotitite with corundum (Pamir) (7.4‰) it was formed of magmatic breeds, most likely under the influence of a mix of fluids: magmatic and metamorphic. Corundum was formed of Alabashka's marble and Pakistan (19.4 – 19.9‰), most likely, as a result of a regional metamorphism of carbonate breeds, at a temperature of 600-6200C under the influence of a metamorfogenny fluid [2]. Thus, the oxygen isotope composition of corundums in fields metamorfogenny, pegmatitovy and pnevmatolit-hydrothermal is dictated by oxygen isotope composition of the water containing fluid participating in their formation.

[1] E. Ya. Kievlenko, Ornamental Collection Minerals, 1987; [2] Okrusch M., Bunch T.E., Bank H. // Mineral.Deposita (Berlin) 1976. № 11. P.278-297.

DOI:10.1180/minmag.2013.077.5.25