

## **Removal of Cs from weathered biotite by hydrogen peroxide with divalent cations**

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Following the accident at Fukushima nuclear power plant in 2011, a considerable amount of research has focused on removing radioactive cesium (Cs) from soil and reducing radioactivity in contaminated area. In particular, Cs ions interact strongly and selectively with 2:1 phyllosilicate clay such as smectite, vermiculite, and illite. Cs is generally adsorbed in the interlayer of these clay minerals, and irreversible adsorption takes places at the frayed edge site (FES), which is highly stable and hardly removable by conventional soil treatment methods. Among the clay minerals, weathered biotite, interstratified layers of vermiculite and biotite, is produced during weathering of biotite to vermiculite. Vermiculitic clay is known to contain more cesium-specific adsorption sites than illitic clay and the amount of FES can increase as weathering of micaceous minerals proceeds. Hydrogen peroxide ( $H_2O_2$ ) was known to cause the exfoliation, which is related to the separation of silicate layers with oxygen formed by the decomposition of peroxide and to the disruption of the equilibrium between the layers and the interlayer cations. In this study, therefore, we attempted to desorb Cs from clay by hydrogen peroxide solution with cations. To verify the effect of  $H_2O_2$  on Cs desorption, we tested  $H_2O_2$  solution with monovalent and divalent cations to desorb Cs from weathered biotite. The results indicated that the expansion of the clay interlayer resulting from the inclusion of oxygen from  $H_2O_2$  and the cation exchange by the larger  $Mg^{2+}$  ions had a synergetic effect on the Cs desorption.