

Migration of radionuclides facilitated by natural groundwater colloids.

Satoshi Utsunomiya[1]

[1] Dept. Chemistry, Kyushu Univ.

Sorption of actinides, particularly plutonium, onto submicrometer-sized colloids increases their mobility, but these plutonium colloids are difficult to detect in the far-field. We identified actinides on colloids in the groundwater from the Mayak Production Association, Urals, Russia; at the source, the plutonium activity is ~1000 becquerels per liter. Plutonium activities are still 0.16 becquerels per liter at a distance of 3 kilometers, where 70 to 90 mole percent of the plutonium is sorbed onto colloids, confirming that colloids are responsible for the long-distance transport of plutonium. NanoSIMS;secondary ion mass spectrometry elemental maps reveal that amorphous iron oxide colloids adsorb Pu(IV) hydroxides or carbonates along with uranium carbonates.