

Removal of Radioactive Strontium from Seawater of Harbor near TEPCO Fukushima Daiichi NPP Using Sodium-Titanate-Impregnated Fiber

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Summary

Radioactive substances such as cesium-137 and strontium-90 were released to the environment by Fukushima Daiichi Nuclear Power Plant of TEPCO, which was damaged by the East Japan Earthquake. In the area in front of seawater intake of No.1 to 4 reactors of the nuclear power plant, seawater contaminated with radioactive substances such as cesium-137 and strontium-90 is currently stored at extremely low concentrations.

For the removal of strontium from seawater, sodium titanate was impregnated onto a commercially available 6-nylon fiber by radiation-induced graft polymerization and subsequent chemical modifications. First, dimethylaminopropyl acrylamide was graft-polymerized onto an electron-beam-irradiated nylon fiber, followed by binding of peroxo complex of titanium anions onto the anion-exchange group of the graft chain. Then, bound titanium species were converted into sodium titanate by a reaction with sodium hydroxide. Equilibrium binding capacity of the fiber for strontium in seawater was calculated as 1.7 mg/g from Langmuir adsorption isotherm.