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Electrodialytic Remediation of Cesium-contaminated Soil

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●Summary● After the 2011 accident at a nuclear power station in Japan, radioactive materials were scattered over the ground surface, mainly in Fukushima Prefecture. Decontamination of the severely contaminated area was conducted primarily to remove radioactive cesium, thereby generating huge amounts of segregated contaminated soil. Removing radioactive cesium from the contaminated soil and reducing its volume are desired. Electrodialytic remediation using Prussian blue adsorbent can remove only cesium ions from the soil. Desorbing cesium ions with other ions from soil by exchange with ammonium ions was attempted, followed by transport of the desorbed ions under a direct-current electric field. Cations were circulated in the system by separating a suspended soil solution compartment from both electrode compartment solutions with cation exchange membranes. Thereby the transported cesium ions were adsorbed specifically onto granulated Prussian blue. A cathode compartment solution was mixed with an anode compartment solution to avoid pH change of the solutions. Spiked cesium ions in black soil were removed effectively using this method, although the method should be improved further to remove them in vermiculite, a strong adsorbent of cesium. This system is expected to be effective for regenerating contaminated soil and for radioactive soil volume reduction.

Key Words: cation exchange membrane, cation transport, ion exchange, Prussian blue, soil regeneration

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