Multi-electrode System for Electrokinetic Remediation of Paddy Soil to Remove Toxic Metals

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Electrokinetic remediation technology is a promising method to recover metal-contaminated soil. In the present study, the experiment was carried out in a reactor cell which was made of bricks (length × width × height = 560 mm × 560 mm × 300 mm), containing 20 kg soil over 60 days. Six electrodes were vertically inserted as anodes on both the sides of soil column, while two electrodes were vertically inserted in the middle of soil area as cathodes. And a voltage gradient of 1.4 V/cm was constantly implemented in the experimental system. The solution of 0.1 M citric acid + 0.1 M sodium chloride (pH=3.24) was added into the experiment as electrolyte. After 60-day treatment, high concentration of residual lead and cadmium were obtained in the center of soil column. Compared with 57.02 % and 69.95 % of lead and cadmium removal efficiencies in whole experiment, 63.93% and 76.87% of lead and cadmium removal efficiencies were obtained in soil column excluding the central zone. X-ray Fluorescence Spectrometry (XRF), X-ray Powder Diffraction (XRD) and Scanning Electron Microscopy (SEM) studies were used to detect changes of soil particle in soil samples.

Keywords: Electrokinetic remediation; Paddy soil; Lead; Cadmium

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