Rapid dry immobilization of contaminated soil containing arsenic using nano-size metallic calcium dispersing and its mechanism elucidation.

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In recent years of Japan, there have been reported cases of soil contamination with significantly overrun levels of arsenic than environmental standards, due to large-scale civil engineering works. Conventional remediation techniques for such contamination involve methods like washing soluble heavy metals from the soil or employing immobilization treatments. However, these conventional methods often require wastewater treatment and longer curing times, posing significant issue to be solved. Under these circumstances, we effectively tackled this challenge by introducing nano-particles of calcium, hereafter denoted as nCa, along with phosphorus compounds into soil contaminated with arsenic. This approach resulted in the swift formation of a hydroxyapatite coating on the soil's surface, effectively immobilizing arsenic. Notably, this groundbreaking technique obviates the necessity for wastewater treatment and enhances the potential for reusing the treated soil, courtesy of the incorporation of calcium-based materials. As the result of many investigations, the mixture of 2wt% nCa and 1.6wt% phosphorus compound are added and mixed to 5g of contaminated soil, in which total amount can reduce 60% compared to the conventional method. The treated concentration has reached less than the environmental standard values.

Biography:

Dr. Yoshiharu Mitoma, Ph.D in Chemical Engineering (1997, Kyushu University), is now full Professor at the Prefectural University of Hiroshima. He currently serves as director of the Resources Recycling Center in the same university. He was a peer in the jury for different projects of the Ministry of MEXT and METI in Japan. Currently his studies specifically examine new detoxification processes for dioxin-like compounds and heavy metals by nanoparticles in soil. Moreover, he challenges to apply this method to reduce radioactive species in polluted soils.