Phosphorus recovery from sewage sludge by an electrokinetic process

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As population keeps growing, it becomes important to guarantee the supply of staple foods, being necessary to assure good level of nutrients in the soil. Phosphorus (P) is a macronutrient indispensable for plants growth and a non-renewable resource, as phosphorites are estimated to be able to supply P for the next ca. 80 years. Additionally, the quality of this raw material has deteriorated due to contamination, which has increased processing costs of mineral P fertilizers. The recovery of nutrients, like P, from secondary resources urges. Sewage sludge (SS) and sewage sludge ash (SSA) from waste water treatment plants (WWTP) may contain contaminants or unwanted elements regarding specific applications, but they also contain secondary resources of high value. Using this ash as a P resource, while removing the contaminants, seems a sustainable option.

The electrokinetic (EK) process can be an effective technique for removing contaminants and recover P from SS and/or SSA. The application of a low-level direct current onto the sludge segment results in both electro-osmotic and electro-migration flows, which are able to induce the migration of ions. For this reason it is expected that phosphate will selectively accumulate in the analyte allowing its recovery. EK remediation is being applied at a laboratory scale, in different matrices and the set of major parameters, which affect the efficiency of EK (e.g. current density, potential difference between electrodes) are being tested and optimized.

This communication aims to discuss preliminary results of the feasibility of EK process to recover P from WWTP target wastes.

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