

# The deposition characteristics of coupled lead ions and suspended silicon powders along the migration distance in water seepage

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## Abstract

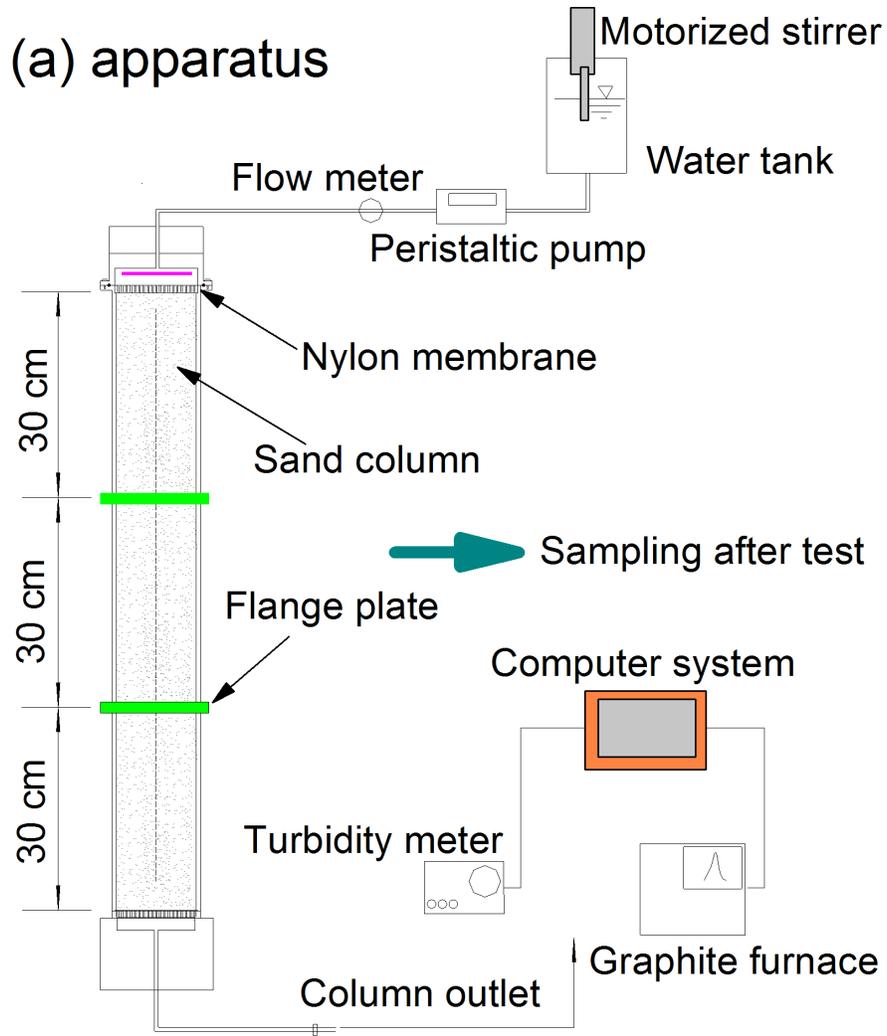
The deposition characteristics of lead ions ( $\text{Pb}^{2+}$ ) in the presence of silicon powders (SPs) were investigated in water seepage in a long one-dimensional sand column experiment. The injected SPs possess a very wide particle-size distribution (PSD). The concentrations of deposited  $\text{Pb}^{2+}$  and SPs and the migration distance along the water flow direction were measured by sampling. The PSDs of the deposited SPs in different sections were obtained by laser diffraction after transport test completion, and microstructure photos were also acquired through metallographic microscopy. Test results show that the presence of SPs may promote or inhibit  $\text{Pb}^{2+}$  migration, which is closely related to the concentration of injected  $\text{Pb}^{2+}$ , particle size and concentration of injected SPs, seepage velocity, and change in the absolute zeta potential in the surface charge. Larger SPs are first deposited within a relatively short distance from the injection surface of the sand column compared with smaller SPs. The median diameter of the deposited SPs near the injection end is larger than that of the injected SPs and gradually decreases with increasing distance, which represents a clear particle-separation characteristic due to the flowing water.

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## (b) test photos



$D_{50}=13.4 \mu\text{m}$



$D_{50}=24.7 \mu\text{m}$

