Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

AGE003-P07 Room:Convention Hall Time:May 27 10:30-13:00

Application of Electrokinetics to Enhance the Degradation of VOCs in Low Permeability Geological Formations

Ming Zhang[1*], Miho Yoshikawa[2], Takeshi Komai[1], Mio Takeuchi[1]

[1]AIST, [2]Chemical Grouting Co.,LTD

Remediation of groundwater and soils polluted by VOCs, like PCE and TCE, with low cost and low energy remains a big challenge in the field of environmental engineering science. Although many kinds of technologies that are available, in principle, for treating VOCs, in situ remediation of them in low permeability geological formations, like clay and slit, is very difficult and generally suffers from incomplete remediation due to the complexity of hydro-geological conditions, the lack of effective microbes that can contribute to biodegradation, and/or low bioavailability of contaminants to microbes.

In this presentation, we compare and discuss the major technologies that are applicable to degradation or remediation of VOCs, summarize the difficulties and limitations associated with remediation of contaminants in low permeability geological formations and finally discuss the potentialities of using electrokinetics to enhance the degradation of VOCs in low permeability geological formations.

Potential application of electrokinetics to enhance the degradation of VOCs includes sequential reduction and oxidation reactions by using electro-activated water or electro-chemically activated water solution; spreading chemical solutions throughout a polluted formation by electro-osmosis flow for direct redox reactions; spreading nutrients and/or electron donors throughout a polluted formation by electro-osmosis flow for accelerating bioremediation; and combination of electro-osmosis flow with reactive barriers or pumping and treat approach. Some typical examples are collected and discussed to illustrate the efficiency of using the electrokinetic technology for accelerating in situ remediation of VOCs in low permeability geological formations.

Keywords: VOCs, Remediation, Degradation, Electrokinetics, Enhancement