

## **Polymer stabilized nZVI-metal nanoparticles for enhanced reductive dechlorination of TCE**

MACHARLA ARUN KUMAR, DAESEUNG KYUNG,  
AND WOJIN LEE\*

Department of Civil and Environmental Engineering,  
Korea Advanced Institute of Science and  
Technology (KAIST), 291 Daehak-ro, Yuseoung-  
gu, Daejeon 34141, Republic of Korea  
(\*correspondence: woojin\_lee@kaist.edu)

The polymer stabilized nanoscale zero-valent iron (nZVI) has been highlighted for its application to remediation sites contaminated by chlorinated hydrocarbons with an enhanced mobility. However, it has shown drawbacks to performing effective degradations of the chlorinated compounds, due to significantly deteriorated reactivity. In this research, we successfully synthesized polymer stabilized nZVI-metal nanoparticles. The results showed that the nanoparticles could effectively transform TCE to non-toxic by-products with significantly enhanced dechlorination kinetics and mobility. The stability and durability of the nanoparticles were also evaluated. We continuously observed a rapid and complete degradation of TCE without leaching of the nanoparticles during the tests. This indicates that the synthesized nanoparticles could be potentially applied to in-situ remediation of the sites contaminated by chlorinated organics with remarkable reactivity, mobility, stability, and durability.