

Nanomaterials and electric field help in the fight against old ecological burdens

Industrial activities and, primarily, imperfect handling with hazardous chemical substances led in the past to the leakage of such materials into the environment.

Substantial funding is currently being expended for the elimination of these so-called “old ecological burdens” in the Czech Republic. The commonly used technologies of “cleaning up” these ecological burdens are based primarily on extractions, which are expensive and not entirely effective methods. A major challenge on the water-treatment market is thus development of completely new remediation technology applicable for “cleaning up” contaminated sites – a technology, which is based on geochemical reactions directly in a geological environment. The interconnection of academic facilities with extensive research potential (Palacký University in Olomouc, Technical University of Liberec) and specialised commercial company (MEGA) clearly defining the objective and parameters of

research, resulted in the formation of a balanced team of experts focused on the development and implementation of innovative decontamination technology.

As a result of applied research thematically targeted at specific requirements, several patented technologies have been founded on newly designed reactive composites (formed by micro particles and nanoparticles of elemental iron) being used in synergy with applied electric current. This completely new approach in decontamination technologies has great application potential for groundwater treatment. Substantial attention was focused on management of the control and inspection of the process as a necessary prerequisite for successful commercialisation the results of the research. The newly developed methods can be successfully deployed even at localities with complicated geological conditions and in densely built-up areas where conventional processes are ineffec-

tive or inapplicable. Other key advantages of the technology are the long-lasting effectiveness of microparticles and nanoparticles of elemental iron in groundwater, their mobility in groundwater sufficient for the creation of a continuous barrier preventing penetration by contaminants and, of no less importance, optimisation of the reaction paths minimising the emergence of undesired (i.e. often toxic) intermediate products of chemical degradation of pollutants, especially chlorinated hydrocarbons. ■

Jaroslav Hrabal, Division Manager, MEGA

Jan Filip, Scientist, Regional Centre of Advanced Technologies and Materials, Palacký University, Olomouc

Miroslav Černík, Scientific Director, Centre for Nanomaterials, Advanced Technologies and Innovations, Technical University of Liberec