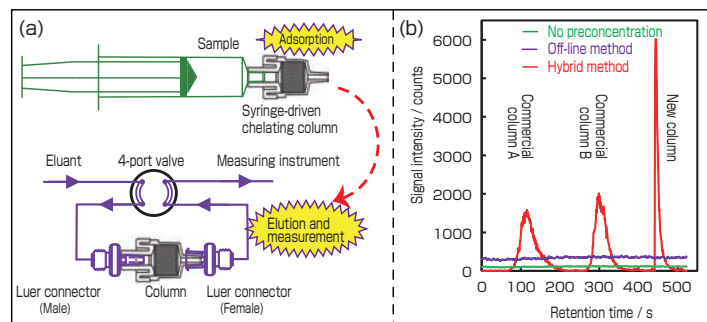


Development of a hybrid preconcentration technique For the highly-efficient preconcentration and highly-sensitive determination of ultra-trace heavy metals

It is important to determine regulated heavy metals such as cadmium, lead, and uranium, whose concentrations are extremely low in the environmental samples. Solid-phase-extraction is one of the effective techniques that could preconcentrate target heavy metals and separate them from the interfering elements. AIST developed a hybrid solid-phase-extraction method (Fig. (a)), in which the sample loading to the syringe-driven column was performed off-line while the elution and measurement of heavy metals were performed on-line. This method integrated the capabilities of multi-sample pretreatment and highly-sensitive measurement, which are the typical merits of off-line method and on-line method, respectively. Figure (b) shows that an off-line method (violet line) and the hybrid method (red line) respectively provided approximately 3-fold and 10-fold (commercial columns) enriched signal intensities compared to that of none-preconcentrated sample (green line). It is noted that the newly developed column could improve the enrichment factor up to approximately 65-fold.



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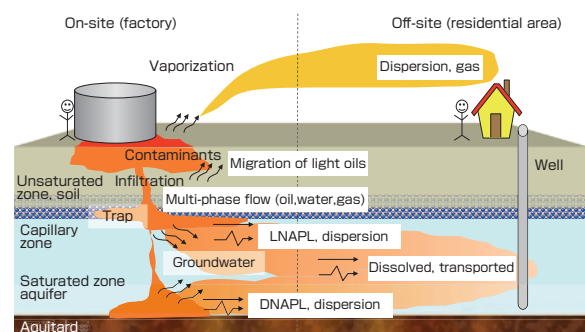
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(a) A schematic diagram of the hybrid method
(b) A comparison of signal intensity*
*Test solution, 1 ppb lanthanum solution; sample volume 5 mL

Disclosing the software system 'GERAS-3' for risk assessment of soil contamination Free distribution of the developed system expecting wider utilization for environmental risk governance in companies and municipalities

We have developed our original software system 'GERAS-3', a geo-environmental risk assessment system with detailed modeling, for the practical risk assessment of soil and groundwater contamination. The development was completed by the integration of various researches in geology, risk analysis, environmental engineering, and computer science. GERAS-3 has some features and advantages, in order to ensure the assessment of multiple contaminants, the 3-dimensional analysis of soil and groundwater, and the risk mitigation after treatment of contaminated soil. We also developed the databases for GERAS-3, such as on soil parameters, transport parameters of porosity and permeability, and various data for contaminants of oils, metals and VOCs. CD-ROMs of GERAS-3 have been distributed for free upon requests from companies and municipalities. We expect the system will be utilized much by a wider range of users including, local governments, factories, consultants, and educators, for self-governance activities and risk communication related to environmental risks from soil and groundwater contamination.



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Advanced risk assessment system for multi-component contaminants of soil and groundwater contamination