Lab-on-a-chip detects trace levels of toxic vapors in homes near Utah Air Force Base

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A lab-on-a-chip technology that measures trace amounts of air contaminants in homes was successfully field-tested by researchers at the University of Michigan.

Even in the presence of 50 other indoor air contaminants, the U-M-built microsystem found levels of the targeted contaminant so low that it would be analogous to finding a particular silver dollar in a roll stretching from Detroit to Salt Lake City.

"This is the first (known) study of its kind," said Ted Zellers, professor in the U-M School of Public Health and the Department of Chemistry, and project director.

"Most lab-on-a-chip technologies are used for biomedical analysis of liquids," Zellers said. "Our technology is designed for monitoring contaminants in the air, and this groundbreaking study is the first to prove that it can work outside the laboratory in real-life applications."

The applications are potentially limitless because the device, called a microfabricated gas chromatograph, can be tailored to detect any contaminants, Zellers said. For instance, the team is adapting the same technology to detect certain industrial chemicals in the breath and saliva of exposed workers, biomarkers of cancer and other chronic disease, and markers of explosives for airport screening applications.

The Department of Defense contracted the U-M team to adapt and test

two prototypes devices in homes near Utah's Hill Air Force Base to measure indoor concentrations of trichloroethylene, or TCE. TCE was used on military bases until the 1970s, and improper disposal caused TCE to become a pervasive groundwater contaminant that can seep into homes above plumes.

"The core microfabricated silicon chips, when stacked, are roughly the size of a wristwatch," Zellers said. They require less power and can be made smaller and less expensively than traditionally manufactured counterparts.

The microsystem was designed and built by faculty and students affiliated with the Center for Wireless Integrated MicroSensing and Systems in the College of Engineering.

Zellers said the group is currently negotiating with several companies interested in commercializing the technology.

More information: For more on Zellers: www.sph.umich.edu/iscr/faculty … fm?uniqname=ezellers

For more on WIMS: wims2.org/

Provided by University of Michigan

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