New microfluidic chip for discriminating bacteria

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A new "on-chip" method for sorting and identifying bacteria has been created by biomedical engineers at Taiwan's National Cheng Kung University. The technique, developed by Hsien-Chang Chang, a professor at the Institute of Biomedical Engineering and the Institute of Nanotechnology and Microsystems Engineering, along with former graduate student I-Fang Cheng and their colleagues, is described in the AIP journal *Biomicrofluidics*.

Using roughened glass slides patterned with gold electrodes, the researchers created microchannels to sort, trap, and identify bacteria. The technique uses surface enhanced Raman spectroscopy. This type of spectroscopy, says Chang, "is based on the measurement of scattered light from the vibration energy levels of chemical bonds following excitation in a craggy metal surface, which enhances the vibration energy." Different components like proteins or other chemical components on the surface of bacteria become attached to the craggy gold zone; when excited, these components cause representative peaks at different wavelengths, creating spectral "fingerprints."

Although some species of bacteria could show very similar signatures because the components on their surfaces are almost the same, says Chang, bacteria from different genera are distinguishable using the technique.

"In the future, different species of fungi could also be sorted based on their different electrical or physical properties by optimizing conditions

such as the flow rate, applied voltage, and frequency," he says. "This portable device could be used for preliminary screening for the pathogenic targets in bacteria-infected blood, urethral irritation, and of raw milk and for food monitoring."

More information: The article, " A dielectrophoretic chip with a roughened metal surface for on-chip SERS analysis of bacteria" by I-Fang Cheng (National Cheng Kung University), Chi-Chang Lin (Tunghai University), Dong-Yi Lin and Hsien-Chang Chang (National Cheng Kung University) appears in the journal *Biomicrofluidics*. link.aip.org/link/biomgb/v4/i3/p034104/s1

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