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Remote Detection of Explosive Molecules by a Microfluidic SERS Device BRIAN PIOREK, SEUNG JOON LEE, MARTIN MOSKOVITS, SANJOY BANERJEE, CARL MEINHART, University of California, Santa Barbara — Free-surface microfluidics (FSF) is combined with surface-enhanced Raman spectroscopy (SERS) to detect trace explosives vapors at room temperature and pressure. A free surface, with a large surface to volume ratio, is created using an open microchannel. Since surface tension is a dominant force at the microscale, it can be used to confine the fluid in the microchannel and create a pressure gradient to drive the flow with velocities ranging from $\sim$ 1um/s - 1mm/s. The curvature of the free surface is measured by confocal microscopy in order to determine the local Laplace pressure in the free-surface microchannel flow. The system has been used for the molecular-specific detection of vapor emanated from explosives such as DNT, TNT and picric acid. The system does not show signs of performance degradation from common interferents such as saturated gasoline vapor and perfume.

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