Supporting information for:

Detection of nerve gases using surface-enhanced Raman scattering substrates with high droplet adhesison

Aron Hakonen*†, Tomas Rindcevicius‡, Michael Stenbæk Schmidt‡, Per Ola Andersson§, Lars Juhlin§, Mikael Svedendahl†, Anja Boisen‡ and Mikael Käll†

† Department of Applied Physics, Division of Bionanophotonics, Chalmers University of Technology, Gothenburg, Sweden. E-mail: Hakonen@chalmers.se, Tel: +46704964657; ‡ DTU Nanotech, Technical University of Denmark, Department of Micro- and Nanotechnology, Ørsteds Plads, Building 345 east, 2800 Kgs. Lyngby; § Swedish Defense Research Agency FOI, Dept CBRN Def & Security, SE-90182 Umea, Sweden
Methods

Nanofabrication

The gold-coated silicon nanopillar SERS substrates were fabricated using a three-step process. In brief, maskless silicon reactive ion etching is utilized to form vertically free standing silicon (Si) pillars with $r \approx 20$ nm in pillars/µm$^2$). Next, the Si nanopillar surface is treated by an O$_2$-plasma, and finally, a 200 nm thick gold film is deposited using e-beam evaporation process. Forming nanopillars with dimensions according to the cartoon below.

Fig. S1 Pillar dimensions are: $a \approx 155$ nm, $b \approx 62$ nm, $r \approx 20$ nm, $hp \approx 400$ nm, $ht \approx 100$ nm.

Raman measurements

A portable Raman instrument, First Defender RMX (Thermo Fisher Scientific Inc, Fig. 2a), was used with a fixed integration time of 10 s and medium output power (measured to 88 mW) for the 785 nm diode laser beam focused on the SERS sample via the flexible optical cable and a lens mounted on an aluminium plate with a working distance of 5 mm. The laser spot diameter on the SERS substrates was approximately 150 µm and the spectral resolution was about 10 cm$^{-1}$ according to the manufacturer.
Fig. S2  Concentration dependence of VX.

Fig. S3  Concentration dependence of Tabun.