

# Gas-Phase Nitroaromatic Detection Based on Sulfonated Tetrafluoroethylene and Its Field Application

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We report on the use of sulfonated tetrafluoroethylene (ST) for explosive sensing and its feasibility for field application. The sensing performance of ST is verified with a quartz crystal microbalance (QCM) setup and a certified standard gas generator. ST can directly capture 2,4-dinitrotoluene (DNT), an indicator molecule of explosives, from the gas. Unlike other newly developed technologies for explosive detection, the use of ST does not need a humid or aqueous environment, which is difficult to maintain in field application. A handheld explosive detector is developed on the basis of ST and a miniaturized QCM system. Its sensitivity is  $-33.52$  Hz/ppb and its limit of detection (LOD) is 1.19 ppb. Furthermore, a semifield test is performed with the device and a field-reproducing setup. This work successively demonstrates the explosive detection capability in an uncontrolled field environment.

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