

228e Solving the Regeneration Problem for Carbon Nanotube Based Chemical Weapons Detectors

Chang Young Lee, Richard I. Masel, Keith Cadwallader, Mark A. Shannon, and Michael S. Strano

We have developed a novel method to remove irreversibly-binding gas molecules from the surface of carbon nanotube gas sensors. Our approach is based upon an analyte-specific surface reaction which decomposes adsorbed analyte molecules. Therefore, it is expected to be applicable not only to carbon nanotube gas sensors but to any type of sorption-based sensors. Extreme reactivity and instability of nerve agents makes our method to be particularly useful for the regeneration of nerve agent detectors. In our work, two kinds of irreversibly-binding nerve agent precursors have been delivered to the dielectrophoretically-deposited nanotube gas sensor array showing a fast response to a small amount of analyte gas followed by a rapid regeneration of the sensor signal. Both electrical transport measurement and Raman spectroscopy are performed to characterize the sensor array and understand the regeneration mechanism.