

Chemical Sensors for Explosives and CW Detection

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This lecture will detail the creation of ultrasensitive sensors based on electronically active conjugated polymers (CPs) and carbon nanotubes (CNTs). A central concept is that a single nano- or molecular-wire spanning between two electrodes would create an exceptional sensor if binding of a molecule of interest to it would block all electronic transport. The use of molecular electronic circuits to give signal gain is not limited to electrical transport and CP-based fluorescent sensors can provide ultratrace detection of chemical vapors via amplification resulting from exciton migration. Nanowire networks of CNTs provide for a practical approximation to the single nanowire scheme and selectivity is generated by covalent and/or non-covalent binding selectors/receptors to the carbon nanotubes. Sensors for a variety of materials and cross-reactive sensor arrays will be described. Polar hydrogen bonding groups provide selectivity for nitro-groups and methods for responding to electrophilic chemical weapons will also be detailed.

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