

Abstract Submitted
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A 2D nanowire network of conjugated polymers and small molecules for sensitive and discriminative biochemical detection WEIGUO HUANG, RYAN HAYWARD, Univ of Mass - Amherst — Field effect transistor (FET) biochemical sensors offer high sensitivity and selectivity, along with portable, real-time and low-cost analyte detection, overcoming many drawbacks associated with traditional techniques such as gas chromatography - mass spectrometry. However, most FET sensors rely on receptors that provide specific binding with the target analyte, which present fundamental limitations for at least two reasons: first, sensors with high specificity to many compounds are difficult to produce due to limited availability of receptors and unavoidable non-specific absorption effects, and second, thousands of discrete sensors are needed to discriminate between common analytes. In contrast, the mammalian olfactory system employs a combinatorial receptor coding scheme to identify odors, rather than distinguishing each odorant by a specific receptor. Here we show that orthogonal ambipolar semiconducting nanowire networks formed by aligned growth of crystals in mixtures of pi-conjugated polymers and small molecules offer a highly sensitive and inherently multi-dimensional platform to discriminate multiple analytes based on multiple different electronic read-outs from a single material layer. Such a platform offers new opportunities in artificial nose design.

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