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Chemical Vapor Sensing Using Dual Channel Hybrid Organic/Inorganic Field-Effect Transistors SHANNON LEWIS, The University of Texas at Austin, SEBASTIAN SCHOEFER, The University of Texas at Ausitn, DEEPAK SHARMA, ANANTH DODABALAPUR, The University of Texas at Austin — We have developed a field-effect chemical sensing device architecture in which two semiconducting channels are employed, one of which is exposed to the analyte and is chemically sensitive. The second channel (usually silicon) is used for signal transduction/amplification. Such sensors work can work in many device modes including one that can be described as a "chemical memory mode". For the chemically sensitive channel, several classes of materials can be employed including small molecule organic semiconductors, conjugated polymers, and inorganic oxides such as SnO_x. With organic semiconductor channels, it is possible to demonstrate charge trapping of volatile organic molecules with significant dipole moments such as ketones and alcohols. We will describe the physics of operation of such sensors in various modes and also outline how the selectivity/sensitivity can be enhanced by incorporating organic receptors.

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