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New Strategies for Thin Film Organic Transistors

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This presentation will explore new strategies for creating thin film organic transistors. One strategy embeds a small fraction of dispersed carbon nanotubes in standard organic semiconductors below the threshold for percolation. This method provides high transconductance organic transistors in spite of relatively large source to drain distances. The improvement of the electronic characteristic of such a scheme is equivalent to a 60-fold increase in mobility of the underlying organic semiconductor. The relatively high mobility can be easily achieved without sacrificing the on/off ratio of the device allowing a path to printable electronic materials. A second strategy involves using new molecular semiconductors that attach and assemble on the surface of high-k dielectrics. The molecules are from a new type of linear acene that has its short ends functionalized with endgroups that react with surface oxides. Incorporating this assembly motif into electronic devices allows field effect transistors to be constructed that have about ten thousand molecules in the channel.