Materials and Patterning Methods for Plastic Electronics

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Abstract

Recent research on organic and polymeric semiconductors is directed towards highly ordered molecular structures in solid states. Through molecular design and engineering, it has been shown possible to control the molecular orientation and processing conditions of these materials as well as fine tuning their energy levels and color emissions. Thin film field-effect transistors (FETs) have been used as testing structures for evaluating the semiconducting properties of new organic semiconducting materials. Performance similar to amorphous-Si can already be realized with some organic materials. Large-scale integration of organic transistors has been demonstrated. In addition, several low cost novel non-lithographic patterning methods have been developed, which resulted in the first flexible electronic paper. The field-effect transistor device structure can also be utilized as a means to induce a great amount of charge carriers in organic thin films through the gate field. Using this type of structure, superconductivity was observed in a highly ordered conjugated polymer.

Biography

Dr. Zhenan Bao is a Distinguished Member of Technical Staff in Bell Laboratories of Lucent Technologies (Murray Hill, New Jersey. She received her Ph.D. degree in chemistry from the University of Chicago in 1995, and then joined Bell Laboratories of Lucent Technologies as a member of technical staff. Her current research interests include rational design and synthesis of organic and polymeric semiconductors for thin film field-effect transistors, light emitting diodes, organic lasers, and plastic superconductors, nonlithographical patterning of optoelectronic devices, and self-assembled molecular structures and micro-objects.