ACS APPLIED MATERIALS & INTERFACES

Editorial

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Preface: Advancing Technology with Organic and Polymer Transistors

There is currently considerable interest in the development of new functional organic conjugated materials and interfaces for use in organic electronic applications. This work in particular has been impacted by the rapid growth in research on new organic and polymer semiconductors and their application as field-effect transistors for consumer electronics. This issue of ACS *Applied Materials & Interfaces* features a Forum focused on the present-day efforts for developing high-performance organic and polymer field-effect transistors. Organic transistors have been actively investigated for well more than 20 years now. These studies have served two key purposes. One is to serve as a "tool" for characterizing the charge-transport properties of organic and polymer semiconductors. The other purpose is to employ this device in applications where modern technology can be advanced in a low-cost manner. The carrier mobilities of the best organic and polymer semiconductors have now exceeded that of amorphous silicon transistors commonly used as the pixel-switching elements in active matrix displays. Another major advantage of organic semiconductors is the ability to deposit thin films at low temperatures, over large areas, and on flexible substrates. In spite of these attractive features, organic transistors still face a host of challenges before they make the transition from academic laboratories to real-world settings for use in advanced technology applications.

This Forum presents interesting breakthroughs and accomplishments from leading researchers in this field. The objective of this Forum is to provide the reader with a survey of present-day examples in organic transistor technology as they make their way in the rapidly evolving area of organic electronics. This compilation of papers includes a Spotlight article that covers recent advances in organic printing processes for fabricating transistors. The ability to improve transistor performance via functional group cleavage in the solid state is eloquently demonstrated, as well as a second contribution that describes the design of small-molecule, thermally stable semiconductors for high-mobility transistors. One article discusses a method for improving carrier transport via solvent annealing, whereas another article reports on binary polymer blends for eliminating "short-channel effects" due to bulk currents. Along this line, another article reports the use of single-crystal nanowire transistors from a new small molecule semiconductor. At the beginning of this editorial, the use of transistors as "tools" for materials characterization was emphasized. A research team from UC Santa Barbara did just that—for an article included here, they employed transistors as a tool for understanding charge separation in small molecule bulk heterojunction solar cells. An approach for doping an intrinsically n-type semiconductor (C_{60}) and converting it to a p-channel transistor was masterfully demonstrated by the group at Stanford. Finally, a novel "double-exposure" photolithography process to fabricating flexible transistors and integrated circuits was debuted in a focused article.

Because of the immense development in the area of organic transistors over the past several years, it was impossible to highlight all the modern advances from research groups around the world. This Forum brought together contributions from some of the most highly dynamic research groups and highlighted their efforts in strongly advancing technology for organic and polymer transistors.

Alejandro L. Briseno, Forum Guest Editor

AUTHOR INFORMATION

Notes

Views expressed in this editorial are those of the author and not necessarily the views of the ACS.

EDITOR'S NOTE

Due to a production error, one of the forum articles was mistakenly printed in an earlier issue. "Improved Field-Effect Transistor Performance of a Benzotrithiophene Polymer through Ketal Cleavage in the Solid State" was published as *ACS Appl. Mater. Interfaces*, **2013**, *5* (5), 1806−1810 and may be accessed at http://pubs.acs.org/doi/abs/10.1021/am303138q.

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