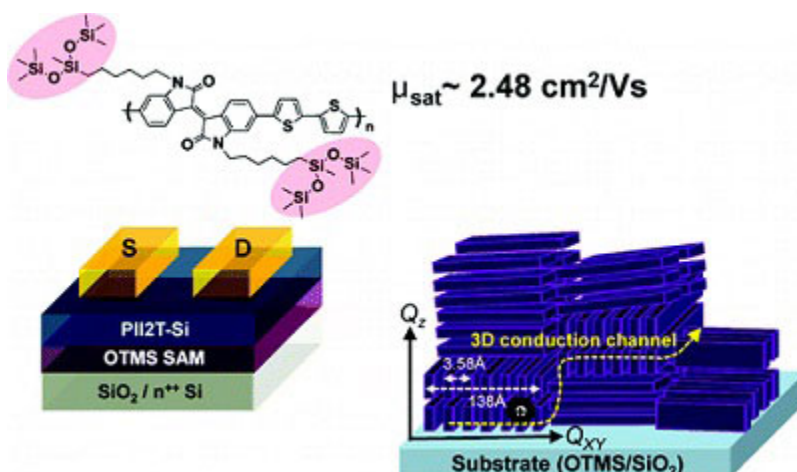


Docket #: S11-381

High Performance Conjugated Polymer for Organic Thin Film

Researchers in Prof. Zhenan Bao's laboratory have invented a novel semiconducting material containing siloxane-containing side chains. This material demonstrates high charge carrier mobility, as well as air and operational stability in field effect transistor devices. Conceivably, it can be used in other optoelectronics such as sensors.



A conjugated polymer made with the novel siloxane-terminated solubilizing group exhibited a *pi-pi* stacking distance of 3.58 Angstroms which led to superior performance in a thin film field effect transistor (maximum mobility of 2.48 cm²/Vs).

Stage of Research

The inventors have demonstrated that this novel siloxane-terminated solubilizing group is an effective side chain in an isoindigo-based conjugated polymer and used the polymer to create a thin-film transistor with one of the highest mobilities to date.

Applications

- Field-effect transistor

- Organic solar cells
- Sensors
- Other optoelectronics

Advantages

- **High performance** - record-high field-effect mobilities of the polymer material
- **High air and water stability**
- **Improved solution-processability**

Publications

- Schwartz, Gregor; Tee, Benjamin C. K.; Mei, Jianguo; et al., "[Flexible polymer transistors with high pressure sensitivity for application in electronic skin and health monitoring](#)" Nature Communication, 2013, 4, 1859.
- Jianguo Mei, Do Hwan Kim, Alexander L. Ayzner, Michael F. Toney, and Zhenan Bao, "[Siloxane-Terminated Solubilizing Side Chains: Bringing Conjugated Polymer Backbones Closer and Boosting Hole Mobilities in Thin-Film Transistors](#)", J. Am. Chem. Soc., 2011, 133 (50), pp 20130–20133, published online November 28, 2011, DOI: 10.1021/ja209328m
- Lee, J; Han, A. R., Yu, Y.; et. al. "[Boosting the Ambipolar Performance of Solution-Processable Polymer Semiconductors via Hybrid Side-Chain Engineering](#)" Journal of the American Chemical Society, 2013, 135, 20130-20133.
- [High-Mobility Structures, Apparatuses and Methods Therefor](#) (U.S. Patent Application, publication no. 20130126836)

Patents

- Published Application: [20130126836](#)

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