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Polymer Blends with High Charge Mobilities and Enhanced Solution-Processability

A new binary polymer blending approach uses conjugated tie chains to achieve high-mobility electronic materials with enhanced solution-processability for future organic electronics and optoelectronics.

Conjugated polymers are promising optoelectronic materials for next-generation flexible and printed electronics. Currently chlorinated solvents are utilized as solvents for polymer semiconductor materials for solution processing. These solvents are toxic. Furthermore, the existing polymer semiconductors do not lend themselves to melt-processing, extrusion, or lamination processing. Therefore, there is a need for approaches that can be applied to conjugated polymers to enhance their solution-processability, as well as lending other types of processability for the conjugated polymers, making them into useful polymer semiconductors for electronic and optoelectronic applications.

Researchers at Purdue University have developed a two-step approach to reveal the nature of the connections between crystalline aggregates in polymer thin films. The first step involves the study of a semiconducting polymer with intentionally placed conjugation-break spacers along the polymer backbone. The second step brings in a fully conjugated polymer that is blended into the non-conjugated polymer matrix as tie chains to bridge crystalline aggregates. The findings elucidate the role of conjugated tie chains for efficient charge transport and enable a new design principle to take advantage of complementary binary polymer blends to obtain high mobility electronic materials with enhanced solution-processability for future organic electronics.

Advantages:

-Elucidates the role of conjugated tie chains for efficient charge transport

-Obtains high mobility electronic material with enhanced solution-processability

-Takes advantage of complementary binary polymer blends

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Category

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Semiconductors/Semiconductor Materials & Substrates

Materials Science & Nanotechnology/Advanced Functional Materials

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Potential Applications:

-Electronics industry

-Optoelectronics industry

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