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Intramolecular locked dithioalkyl bithiophene based semiconductors for high performance organic field effect transistors

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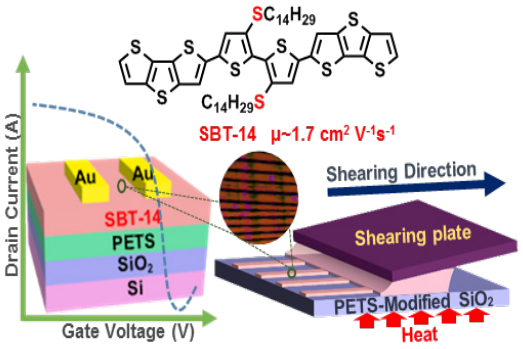
New 3,3'-dithioalkyl-2,2'-bithiophene (SBT) based small molecular and polymeric semiconductors are synthesized by end-capping or co-polymerization with dithienothiophen-2-yl (DTT) units. Single crystal, molecular orbital computations, and optical/electrochemical data indicate that the SBT core is completely planar likely via S(alkyl)··S(thiophene) intramolecular locks. Therefore, compared to semiconductors based on the conventional 3,3'-dialkyl-2,2'-bithiophene (BT), the resulting SBT systems are planar (torsional angle<1°) and highly π-conjugated. Charge transport was investigated for solution-sheared films in field-effect transistors demonstrating that SBT can enable good semiconducting materials with hole mobilities ranging from ~0.03 to 1.7 $cm^2 V^{-1} s^{-1}$. Transport difference within this family was rationalized by film morphology as accessed by grazing incidence X-ray diffraction (GIXRD) experiments.



Biography

Sureshraju Vegiraju has his expertise in Synthetic Organic Chemistry. He develops conjugated organic materials for the applications in organic electronics and studies the opto- electronic properties.

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