Small Molecule-Polymer Blend Semiconductors and High-k Polymer Dielectrics for Organic Electronics

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Thin blend films of semiconducting small molecule and insulating polymer are very promising as solution-processable active layers for organic thin film transistors (OTFTs), since they combine the excellent electrical properties of small molecule semiconductors and the solution processability and the passivation capability of polymer thin films. We will present recent results on the electrical characteristics, phase segregation, and ordering behavior of thin blend films prepared with different small molecule semiconductors and binder polymers with varying molecular mass and surface interaction energy. Such structural characteristics provided the critical insight for understanding and improving the desired electrical properties of blend semiconductors. We also prepared and investigated a high-dielectric polymer insulator as gate dielectric in OTFTs, by employing a novel design concept for obtaining high-dielectric constant polymers with high glass transition temperature and low surface energy.