

From silicon to plastic: materials design and process considerations

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Printed, flexible and even stretchable electronics have potential as low cost alternatives for devices in application ranging from energy to health care to security. However, their successful commercialization relies on the design and development of sustainable, robust and reliable materials and processes. Molecular design plays a significant role in determining materials electronic performance, but structure is not the only consideration. Device performance also depends critically on semiconductor alignment at many length scales. Importantly, materials' nano- through meso-structure can be manipulated in solution prior to device fabrication, and the macroscopic long-range order required for high performance devices may be achieved through process optimization which utilizes materials structure-process-property relationships. This presentation will provide an overview of how structure-process-property relationship consideration can be applied to several classes of advanced electronic materials – from devices to energy storage and conversion.