

Novel Approaches to Photovoltaic Devices and Materials

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The development of solution-processable small molecules and polymeric materials with good electron transporting properties is highly desired for various applications in organic-based electronics. The vast majority of materials known today exhibit p-channel (hole-transporting) behavior. In direct contrast, air-stable n-channel (electron-transporting) semiconductors and polymeric materials that show solid-state transport of both hole and electron carriers are significantly less developed. Consequently, a major research challenge in this field is to synthesize novel building blocks that allow both the lowest unoccupied molecular orbital (LUMO) and highest occupied molecular orbital (HOMO) to be systematically varied. Notable outcomes from these studies include:

- development of synthetic strategies for incorporation of azulene units into conjugated polymers
- synthesis of oligo thiophene-S,S-dioxide materials
- identification of novel physical and electronic properties for these systems

