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Organic Semiconductor Photovoltaics

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Recent developments on organic photovoltaic elements are reviewed. Semiconducting conjugated polymers and molecules as well as nanocrystalline inorganic semiconductors are used in composite thin films. The photophysics of such photoactive devices is based on the photoinduced charge transfer from donor type semiconducting molecules onto acceptor type molecules such as Buckminsterfullerene, C_{60} and/or nanoparticles. Similar to the first steps in natural photosynthesis, this photoinduced electron transfer leads to a number of potentially interesting applications which include sensitization of the photoconductivity and photovoltaic phenomena. Examples of photovoltaic architectures are discussed with their potential in terrestrial solar energy conversion. Several materials are introduced and discussed for their photovoltaic activities. Furthermore, nanomorphology has been investigated with AFM, SEM and TEM. The morphology/property relationship for a given photoactive system is found to be a major effect.