

**Electrochemical and Photochemical Characterization
of Conjugated Polymers and Fullerenes for
Photovoltaic Applications**

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Conjugated polymeric semiconductors are attractive materials for opto-electronic applications such as light emitting diodes, thin film transistors as well as photovoltaic cells. They combine the properties of semiconductors and processing advantages of the polymers which shall enable large area, flexible type applications with scale up advantages. In characterization of these materials, electrochemical in situ spectroscopy as well as photoinduced excited state spectroscopy take a prominent role. The properties are strongly dependent on chemical as well as morphological structure of the solid thin films of these materials. Controlled studies using in situ spectroelectrochemistry as well as photoinduced energy/electron transfer spectroscopy show the formation of charged polarons upon electrochemical- and photodoping. The photovoltaic cells developed from these materials in solid state composite with fullerenes yield up to 3% energy conversion efficiencies.