

# **Concept for Designing Highly Efficient Polymer Light Emitting Diode and Solar Cell**

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## **Abstract**

Semiconductive polymers possess light-charge inter-conversion capability as inorganic semiconductors and are suitable for applications in light emitting diode (LED) and photovoltaic cell (PV). For LED, the topics to be included are: self dopant formation in poly(fluorene)s by self organization into well aligned beta-phase; effective shielding of triplet back energy transfer from phosphor dopant to host polymer; creation of gradient HOMO levels for effective hole injection in spiro-poly(fluorene)s for efficient deep blue emission; design of single polymer able to emit sharp red-green-blue emissions simultaneously; and creating a pseudo-metallic state of metal ion by intercalating it into crown ether grafted onto polyfluorene as electron injection layer so that high work function aluminum can be used as cathode. For PV, the topics to be included are: design of electron transport polymer having the multiple functionalities: optical spacer, electron transport, and hole blocking; and fullerene-doped zinc oxide film as cathode for effective electron collection.