

# Synthesis of Photo-crosslinkable Polyfluorenes for the Applications of Multi-Layer Polymer Light Emitting Diodes

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## Abstract

The goal of this study is aimed at synthesizing a class of photo-crosslinkable polyfluorene with oxetane side groups. These materials have potential application for the multi-layer polymer light emitting diodes using a spin-coating process. We synthesized a series of oxetane-containing polyfluorene (P1 and P3~P7) which emit respectively R,G,B three main colors of light. Polymer P1 exhibits blue emission at 452nm, both polymers P3 and P4 exhibit green emission peak at 543 nm, while polymers P5 ~ P7 exhibit red emission around 636 nm.

For comparison purpose, we also synthesized a polyfluorene (P2) which has similar chemical structure with polymer P1 except that it contains no oxetane unit. Both polymers are fabricated in a similar condition to form devices with the configuration of ITO/PEDOT/P1 or P2/Ca/Al. The results demonstrated that the crosslinked P1 films are insoluble and the device P1 polymer could be driven to higher current density before breakdown occurred. Therefore, we are able to fabricate white light multi-layer polymer light emitting diodes by a simple spin-coating process. The device emits white light with a CIE coordinate  $(x, y) = (0.369, 0.326)$  at 28V.