Prof. Yun Chen

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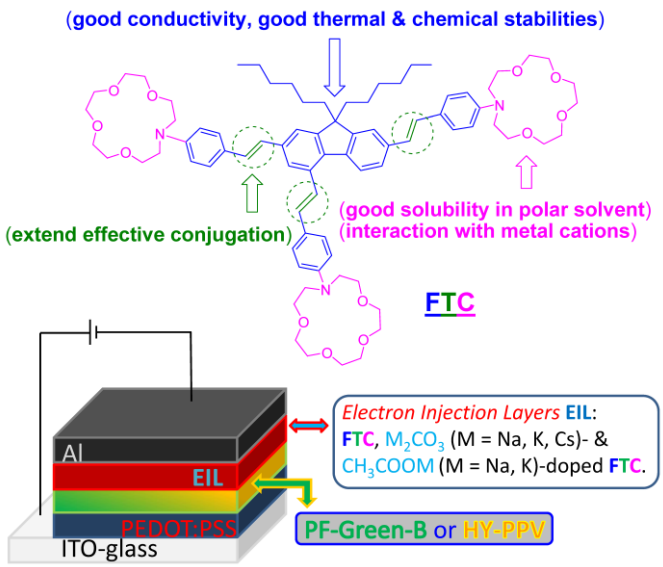
Research Interests

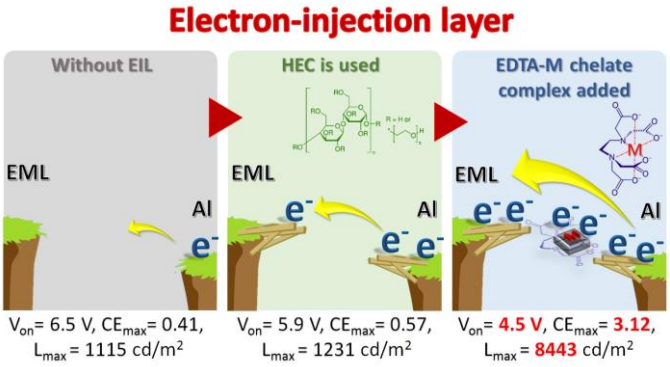
1) Electroluminescent Conjugated Polymers: Molecular design and synthesis of fully conjugated electroluminescent low MW and polymers. Fabricate polymer light-emitting diodes (PLEDs) using the polymers to investigate their optoelectronic properties, including maximum luminance, current efficiency, and power efficiency.
2) Electron-Injection and Hole-Buffer Materials: Preparation and characterization of alcohol/water soluble oligomers or polymers containing electron-transporting groups, such as triazole and oxadiazole, and polar groups. The materials are employed as electron-injection or hole-buffer layer in PLEDs or solar cell to enhance device efficiency.
3) Photoluminescent Chemical Sensory Compounds and Polymers: Synthesis of low MW and polymeric photoluminescent materials with recognition groups for sensory applications. Chemical structures of receptor and transducer are varied to investigate their influence on sensitivity and selectivity.

Representative Publications

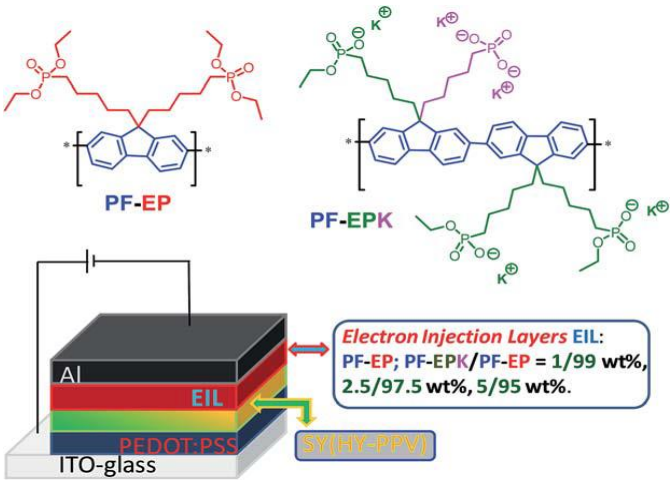
1) Juin-Meng Yu, Yun Chen*, "Multi-functional Hyperbranched Oligo(fluorene vinylene) Containing Pendant Crown Ether: Synthesis, Chemosensory and Electroluminescent Properties", ***Macromolecules***, 42(21), 8052-8061 (2009).
2) Chia-Shing Wu, Huai-An Lu, Ying-Ju Lin and Yun Chen*, "Synthesis and Characterization of Triple-Azacrown Ethers Containing Fluorene-Cored Derivative: Application as Electron Injection Layer for Significantly Enhanced Performance of PLEDs", ***J. Mater. Chem. C***, 1, 6850–6860 (2013).
3) Chia-Shing Wu, Yu-Sing Wu and Yun Chen*, "Water-soluble 1,2,4-triazole with diethylene glycol monoethyl ether groups: synthesis, characterization and application as electron injection layer for PLEDs", ***Physical Chemistry Chemical Physics***, 16(19), 8927-8934 (2014).
4) Chia-Shing Wu, Chen-Yi Chou and Yun Chen*, "Copolyfluorenes Containing Partially Hydrolyzed Phosphonate Pendant Groups: Synthesis, Characterization and Application as Electron Injection Layer for Enhanced Electroluminescence of PLEDs", ***J. Mater. Chem. C***, 2(32), 6665-6674 (2014).
5) Cheng-Liang Wu and Yun Chen*, "Hydroxyethyl Cellulose Filled with M^{2+} Chelate Complexes with Ethylenediaminetetraacetic Acid (EDTA) as an Effective Electron-Injection Layer for Polymer Light-Emitting Diodes", ***Organic Electronics***, 25, 156–164 (2015).
6) Tso-Hsing Fan and Yun Chen*, "Solution-Processable Bipolar Host Material Composed of Fluorenyl, Carbazolyl and 1,3,4-Oxadiazolyl Derivatives: Synthesis and Application in Phosphorescent Organic Light-Emitting Diodes", ***J. Mater. Chem. C***, in press (2016) (DOI: 10.1039/C6TC01108J).



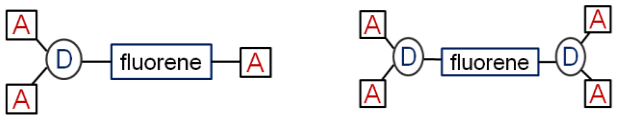
Novel azacrown-containing fluorene derivative (**FTC**) was prepared and applied as electron-injection layer (EIL) in polymer light-emitting diodes (PLEDs). When doped with metal carbonates and metal acetates, it significantly enhances device performance of PLEDs with PF-Green-B or Super Yellow (HY-PPV) as emitting layer.



Hydroxyethyl cellulose (HEC) composited with EDTA-M (M: metal ions) chelate complexes was prepared and applied as an effective electron-injection layer in PLEDs, resulting in about 6~7 times enhancement in luminance and current efficiency.

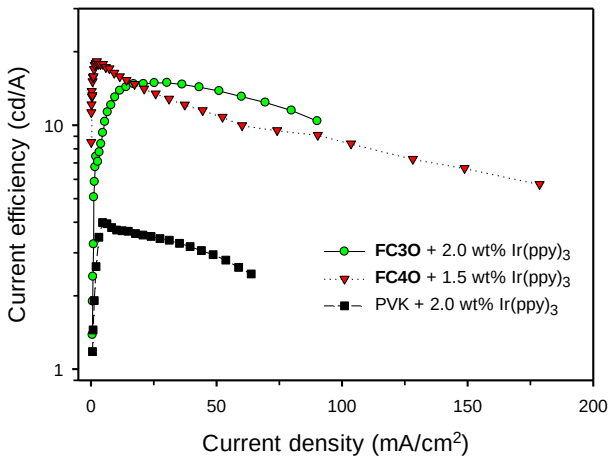


Copolyfluorenes containing pendant phosphonate groups (**PF-EP**) or partially hydrolyzed phosphonate groups (**PF-EPK**) were prepared and applied as electron-injection layer. They significantly enhance the performance of PLEDs depending on the percentage of **PF-EPK**.



FC3O **FC4O**

Donor (D): N-Carbazolyl; Acceptor (A): Oxadiazolyl.



Two new bipolar compounds (**FC3O**, **FC4O**) were synthesized and applied as hosts for phosphorescent organic light-emitting diodes, using spin-coating process to cast homogeneous emission layer. Their device performances outperform conventional polymeric host PVK.