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Optical Absorption and Emission of Fully Conjugated Heterocyclic Aromatic Rigid-rod Polymers Containing Sulfonated Pendants SHIH JUNG BAI, SHEN-RONG HAN, Institute of Material Science and Engineering, National Sun Yat-sen University — Fully conjugated poly[(1,7-dihydrobenzo[1,2-d:4,5-d']*di*imidazole-2,6-diyl)-2-(2-sulfo)-*p*-phenylene] (sPBI) has a *para*-catenated rod-like backbone, which was synthesized and fabricated for *mono*-layer polymer light-emitting diode (PLED) showing a threshold voltage of 4.5 V and a green light (530 nm) emission. Its SO_3H moiety attached to the *p*-phenyl ring improved electron *de*localization along the backbone resulted in a *red shift* of absorption spectrum. sPBI was further derivatized for rigid-rod polyelectrolyte sPBI-PS(Li^+) by attaching propanesulfonated pendants to the heterocyclic moiety of intractable sPBI for water solubility. This fully conjugated polyelectrolyte sPBI-PS(Li^+) was fabricated for light-emitting electrochemical cells (PLECs) with a dopant of $LiCF_3SO_3$ or $LiN(CF_3SO_2)_2$ for effects of propanesulfonated pendants and lithium dopants on lunimescent emission and on room-temperature conductivity. sPBI-PS(Li^+) PLECs doped with 0.41 and 1.01 wt.% of $LiN(CF_3SO_2)_2$ showed higher green light (514 nm) electroluminescence emission intensity with a threshold voltage of 3.0 V and -4.6 V, respectively. Emission intensity of the sPBI-PS(Li^+) PLEC did not raise upon increasing the conductivity of the luminescent layer.

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