Electronic Supplementary Information (ESI)

Experimental

The synthesis of the PC-Pr films:

PC was purchased from Dows company, (the ^{1}HNMR ($CDCl_3$) result: δ1.7ppm (m, 6H, —CH_3); δ7.18～7.29ppm (—C_6H_4—)). $Pr(NO_3)_3.6H_2O$ were purchased from Aldrich and used without further treatment.

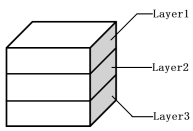
20mL CH_2Cl_2 and 5mL DMF solution containing 0.117g PC and 0.11g $Pr(NO_3)_3.6H_2O$ were placed in a Schlenk-type glassware with stirrer. The reaction mixture was stirred at 30℃ for 6h. After evaporating the solvent under the reduced pressure, the crude product was purified by silica gel column chromatography (eluent: CH_3OH:CH_2Cl_2 =1:10). Finally, 0.152g target product PC-Pr Ⅰ was obtained as light yellow uneven film. (the ^{1}HNMR ($CDCl_3$) result : δ1.62～1.70ppm (m, 6H, —CH_3); ä7.18～7.29ppm (—C_6H_4—).)

Changing the amount $Pr(NO_3)_3.6H_2O$, for instance to, 0.22g and 0.33g, and then repeating the above experiment, corresponding 0. 196g PC-Pr Ⅱ (the ^{1}HNMR ($CDCl_3$) result : ä1.57～1.70ppm (m, 6H, —CH_3); δ7.18～7.29ppm (—C_6H_4—)).and 0.217gPC-Pr Ⅲ(the ^{1}HNMR ($CDCl_3$) result : δ1.67～1.70ppm (m, 6H, —CH_3); δ7.18～7.29ppm (—C_6H_4—)).were obtained.

For the sake of the parallel comparison, 0.1g PC and PC-Pr, Ⅰ, Ⅱ, Ⅲ was dissolved in 15mL CH_2Cl_2 in a 25ml bleaker respectively, and then after the volatilization of the solvent, the uniform films of PC and PC-Prs were formed for measurements.

Instrumentation: The molecular structure of the products was characterized by ATR-IR, NEXUS870, spectrometer (Nicolet Co., USA). Raman measurements were made on a Horiba Jobin Yvon Raman spectrometer. The 514.5nm line of an argon ion laser was used as the excitation source. ^{1}HNMR spectra (on Bruker DRX500 spectrometer operating at 500 MHz) were recorded by using $CDCl_3$ as a solvent. The elemental analysis of the products was measured using an energy-dispersive spectrometer (EDS, EX-250, HORIBA) calibrated by taking Co element as reference. Molecular weight and its distributions were determined by GPC on a Waters 515 equipped with a Waters 2487 Ultraviolet absorbance detector and Wyatt Technology OptilabrEX refractive index detector. The columns were STYRAGEL HR3, HR4 and HR5 (300×7.8 mm) from Waters. HPLC grade THF was used as eluent at a flow rate of 1 ml/min. DSC was conducted on a Perkin-Elmer Pyris 1 DSC calorimeter with a heating rate of 10℃ /min and a cooling rate of 40℃/min. All samples were heated to a temperature above the isotropic temperature and then cooled to room temperature and scanned for the second time to eliminate thermal history. All DSC curves shown in figures refer to the second run. The dielectric properties were measured using Hewlett-Packard Impedance Analyzer 4194A. The general tensile tests were performed on INSTRON 4466, INSTRON Co. England. The UV-vis spectra were record with Shimadzu UV 2401 spectrometer. The Emission spectra (λ_{ex}=340nm) and the excitation spectra (λ_{em}=580nm)were recorded with a Shimadzu RF-540 spectrofluorimeter.

Table S1 EDS results for the cross-section of PC-Prs

Samples	Layer 1 Pr% (wt)	Layer 2 Pr% (wt)	Layer 3 Pr% (wt)	
PC-Pr I	5.22	10.33	14.62	
PC-Pr II	7.84	16.27	26.69	
PC-Pr Ⅲ	10.86	28.04	33.55	

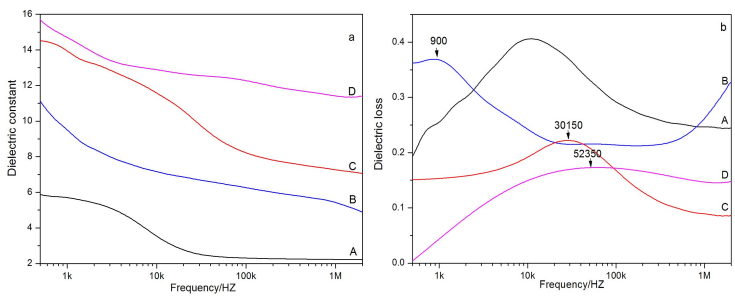


Figure S1. Dielectric constant (a) and dielectric loss (b) of PC (A) and PC-Pr Ⅰ(B), PC-Pr Ⅱ(C), PC-Pr Ⅲ(D) as a function of frequency from 500 Hz to 2MHz

Table S2. General tensile test results for the PC and PC-Prs

Samples	Stress at Break(MPa)	Young's Modulus (MPa)
PC	15.78	588.63
PC-Pr Ⅰ	22.47	991.52
PC -Pr Ⅱ	26.89	1012.46
PC -Pr Ⅲ	29.61	1052.87