

Synthesis of PBT-T1

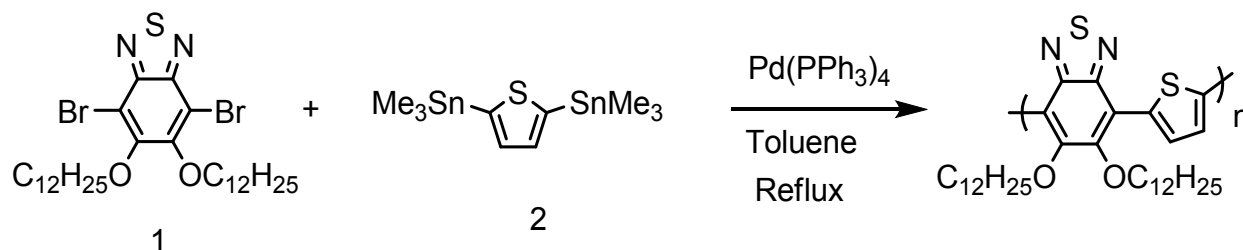


Figure 1 Synthesis procedure for PBT-T1

Compound 1:

4,7-Dibromo-5,6-bis(dodecyloxy)benzo[c][1,2,5]thiadiazole

Compound 2:

2,5-bis(trimethylstannyl)thiophene

Materials

All chemicals and reagents were used as received from commercial sources without purification. Solvents for chemical synthesis were purified by distillation. Chemical reactions were carried out under a nitrogen atmosphere. 4,7-Dibromo-5,6-bis(dodecyloxy)benzo[c][1,2,5]thiadiazole (1)¹, 2,5-bis(trimethylstannyl)thiophene (2), 5,5'-bis(trimethylstannyl)-2,2'-bithiophene (3) and 2,5-bis(trimethylstannyl)thieno[3,2-b]thiophene (4) were prepared according to literature methods with fine adjustment.

Procedure of Copolymer PBT-T1 Synthesis

Compound (1) (0.331 g, 0.5 mmol) and compound (2) (0.205 g, 0.5 mmol) were dissolved in toluene (15 mL), and purged under a nitrogen atmosphere for 30 min. Subsequently, Pd(PPh₃)₄ (20 mg) was added into the flask, and the reaction mixture was stirred and refluxed for 48 h. After being cooled to room temperature, the reaction mixture was poured into methanol. The collected solid was re-dissolved in chloroform and filtered to remove the metal catalyst. Then, the copolymer solution was concentrated and precipitated in a large amount of methanol. The solid was further purified by a Soxhlet extractor for 12 h in order with methanol, acetone as a solvent, and dried in a vacuum oven at 60 °C overnight. The yield was 67%.

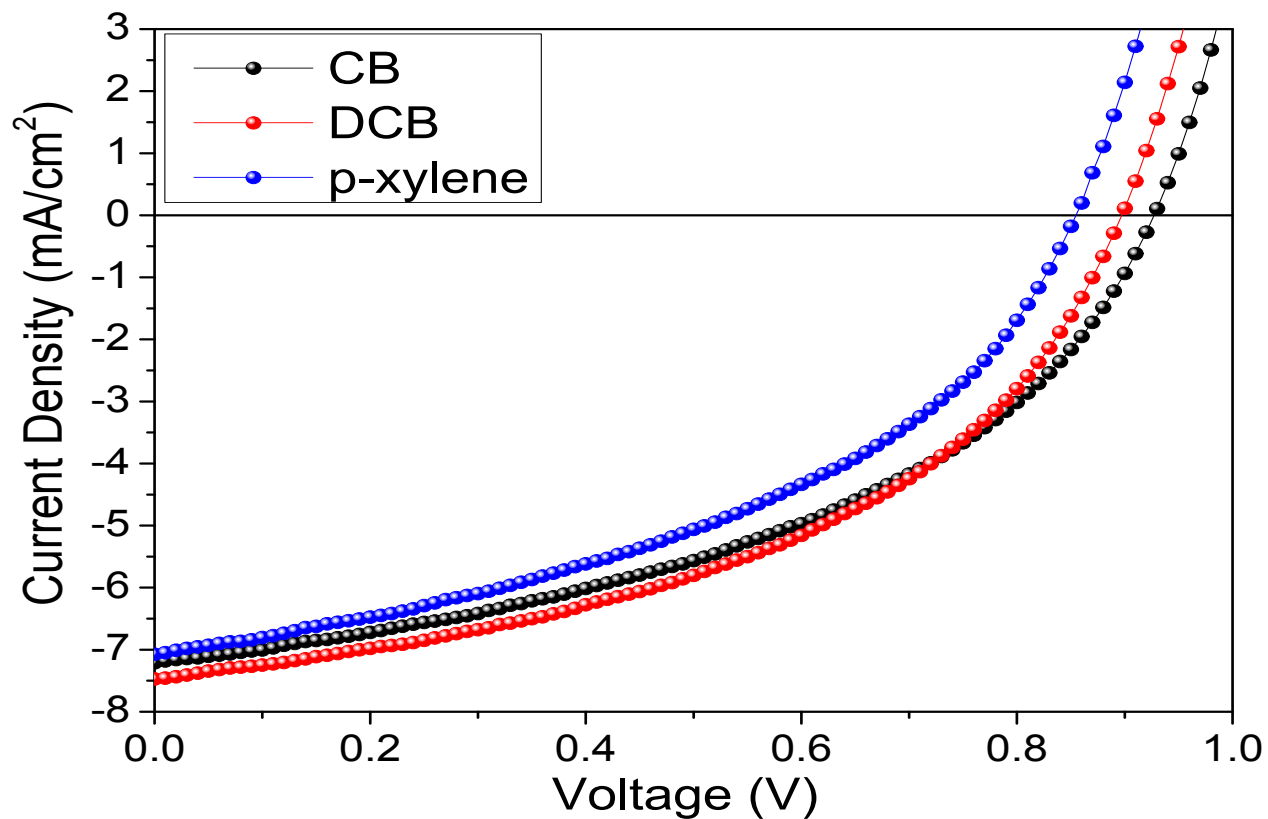


Figure 2 Current Density-Voltage characteristics of PBT-T1:PC₆₀BM (1:2) solar cells processed with different solvents

	V_{oc} (V)	J_{sc} (mA/cm ²)	Fill Factor	Efficiency (%)
CB	0.93	7.21	0.45	2.99
DCB	0.90	7.47	0.46	3.09
p-xylene	0.85	7.07	0.43	2.61

Table 1 Photovoltaic Parameters of PBT-T1:PC₆₀BM Solar Cells (1:2) processed with different solvents

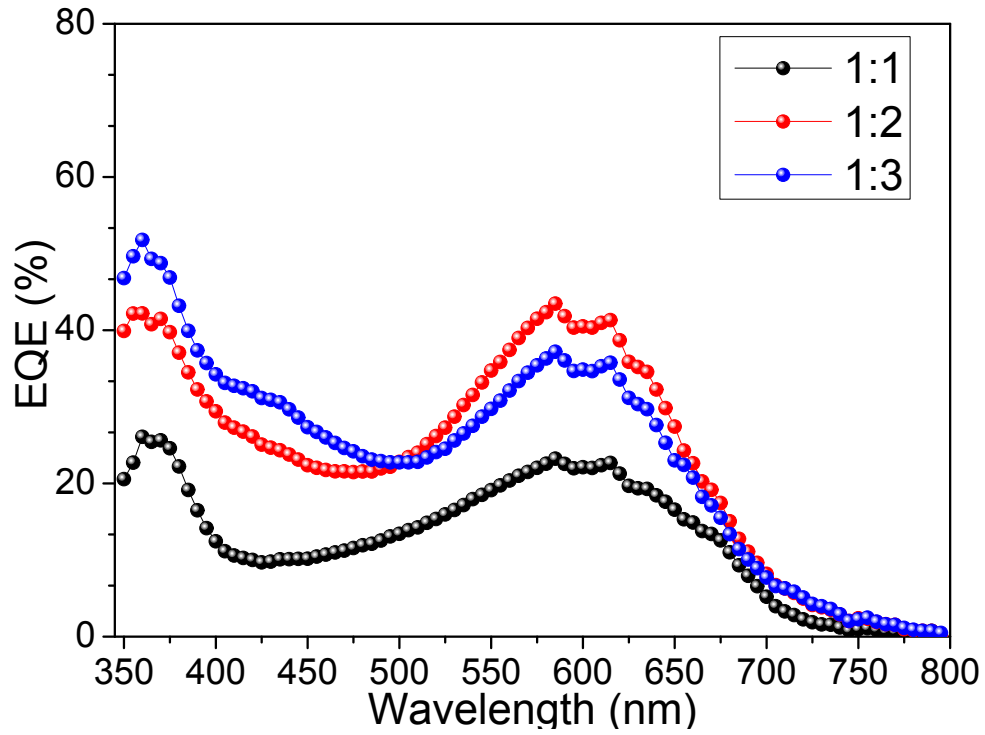


Figure 3 EQE of PBT-T1:PC60BM Solar Cells processed without additive