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Supporting Information for

An Efficient Hole Transport Material Based on PEDOT Dispersed with Lignosulfonate: Preparation, Characterization and Performance in Polymer Solar Cells

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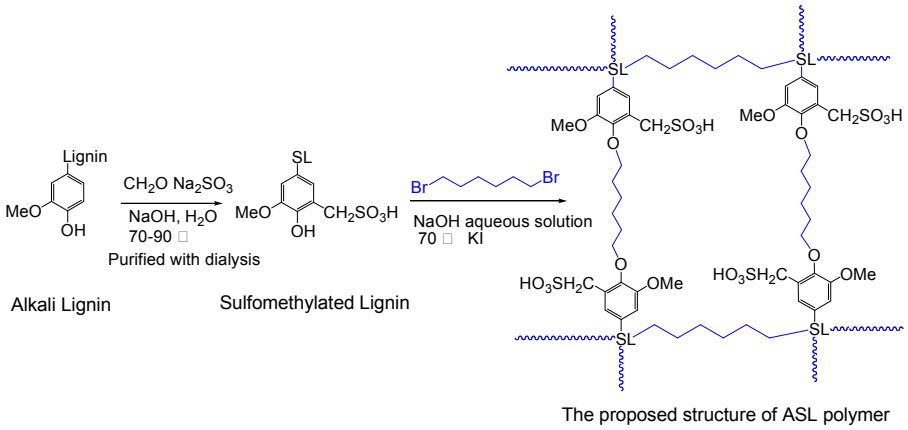

Fig. S1 Synthetic route of supramolecular ASL polymer.

Table S1 Effect of 1,6-dibromohexane on the molecular weight distributions and functional group contents of ASL.

Samples	*Mw* (Da)	*Mn* (Da)	PDI	Functional group contents	
				-OH (mmol g^{-1})	-SO_3H (mmol g^{-1})
SL	5500	2600	2.12	1.58	1.81
ASL	153000	38200	4.00	0.11	1.52

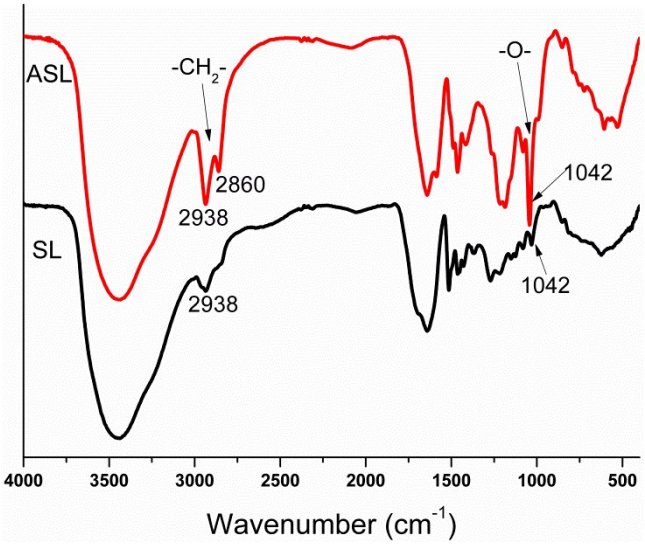

Figure S2. FT-IR spectra of SL and ASL

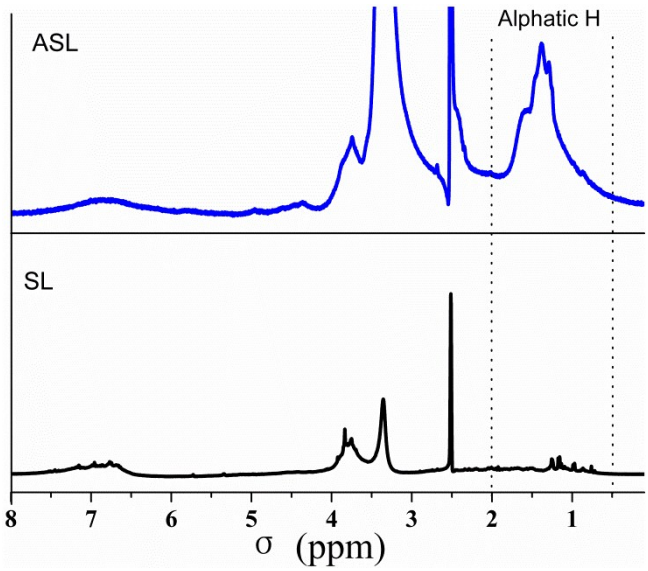

Figure S3. [1]HNMR spectra of SL and ASL

Table S2 The conductivities of PEDOT:PSS-4083 film, PEDOT:SL films and PEDOT:ASL films with different mass ratio of dopant.

Samples	Sheet resistance (Ω □$^{-1}$)	Film thickness (nm)	Conductivity (S cm^{-1})
PEDOT:PSS-4083	59644	8383	0.02
PEDOT:SL-1:1	180018	1111	0.05
PEDOT:SL-1:2	67150	4964	0.03
PEDOT:SL-1:6	232558	2150	0.02
PEDOT:ASL-1:1	—	—	—
PEDOT:ASL-1:2	—	—	—

Note: The sheet resistance of the films formed with PEDOT:ASL is too large to test.

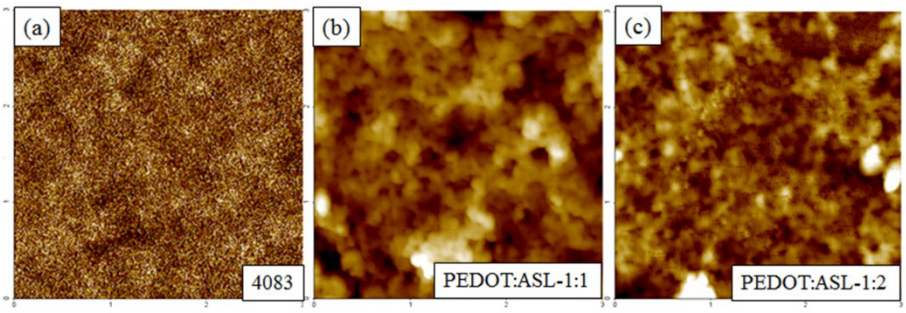

Figure S4. AFM images of PEDOT:PSS (Baytron PVPAI 4083) film (a) , PEDOT:ASL-1:1 film (b) and PEDOT:ASL-1:2 film (c) after heating (120 ℃ for 20 min). The size of the images is 3μm×3μm.