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Supporting Information for

Ultrahigh molecular weight lignosulfonate-based polymers: preparation, self-assembly behaviours and dispersion property in coal-water slurry

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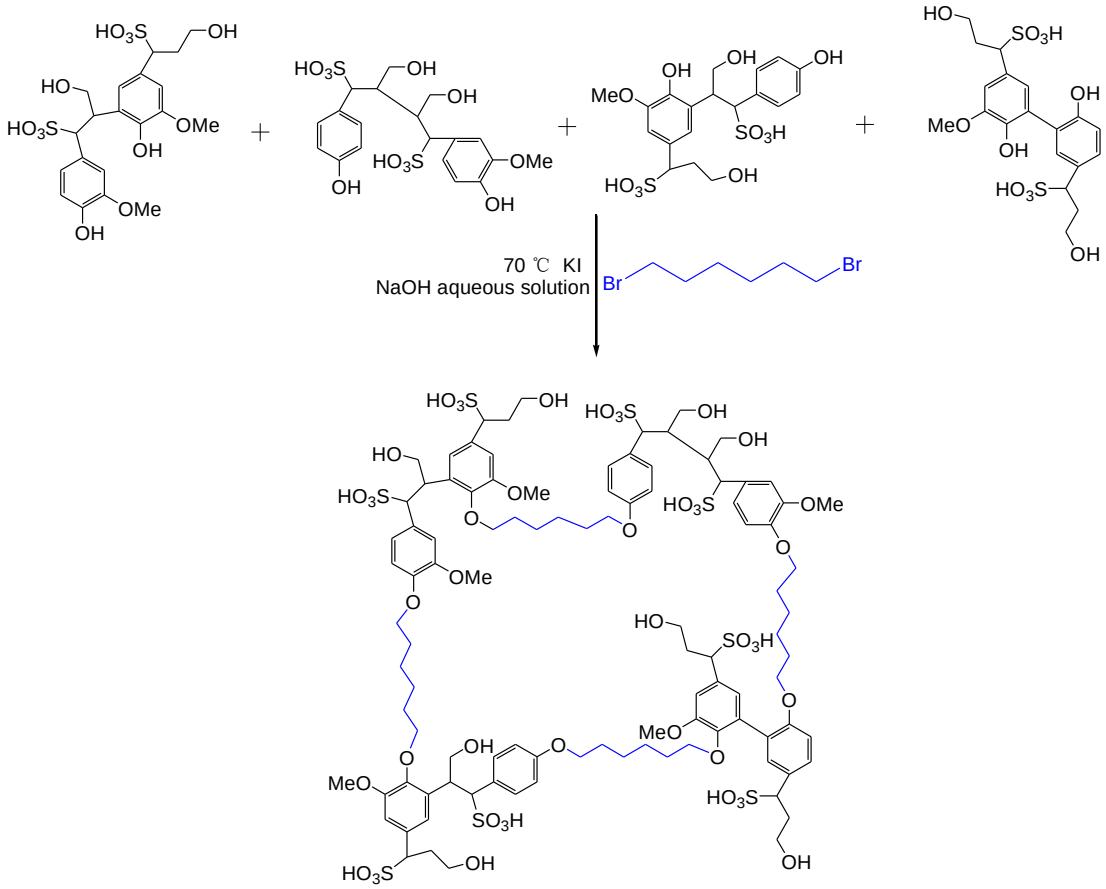
Supplemental Figures

Scheme S1. Synthetic approach of ultrahigh molecular weight ALS.

Four representative LS monomers :



The proposed structure of ALS polymer

Table S1 The proximate and ultimate analyses for Shenhua coal sample.

Sample	Proximate analysis/%			Ultimate analysis/%, daf						HGI
	M_{ad}	A_d	V_{daf}	C	H	O	N	$S_{t,d}$	C/O	
Shenhua coal	6.89	9.28	32.24	81.62	4.52	12.16	1.12	0.54	6.71	56

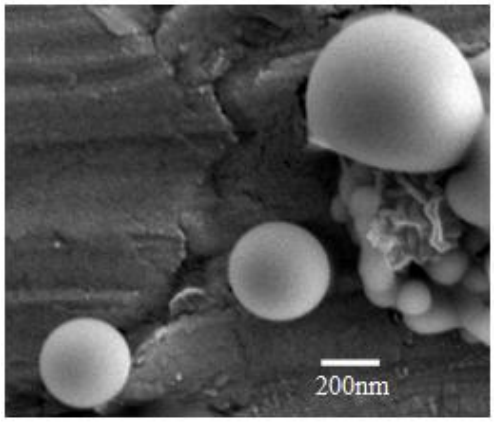


Fig. S1 SEM image of quasi-solid spheres with ALS and CTAB via self-assembly.

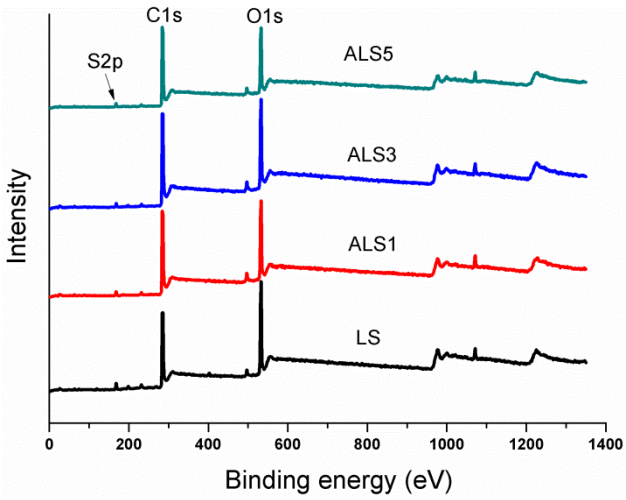


Fig. S2 XPS spectrum of the surface of ALS hollow nanospheres via self-assembly from EtOH/H_2O (9/1, v/v).

Table S2 Elemental distribution of the quasi-solid nanospheres with ALS and CTAB via self-assembly (called AC) by elemental analysis method (left), and XPS method (right).

Sample	By Elemental analysis			By XPS method		
	C %	N %	C/N	C %	N %	C/N
AC	59.05	2.06	28.66	70.51	2.43	29.01

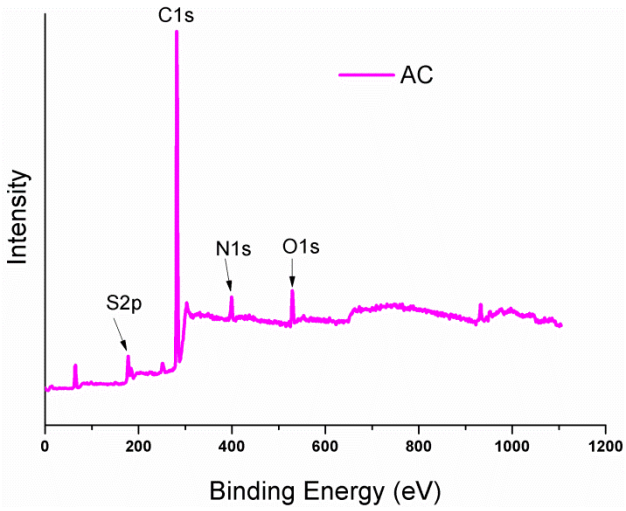


Fig. S3 XPS spectrum of the surface of the quasi-solid spheres with ALS and CTAB via self-assembly (called AC).

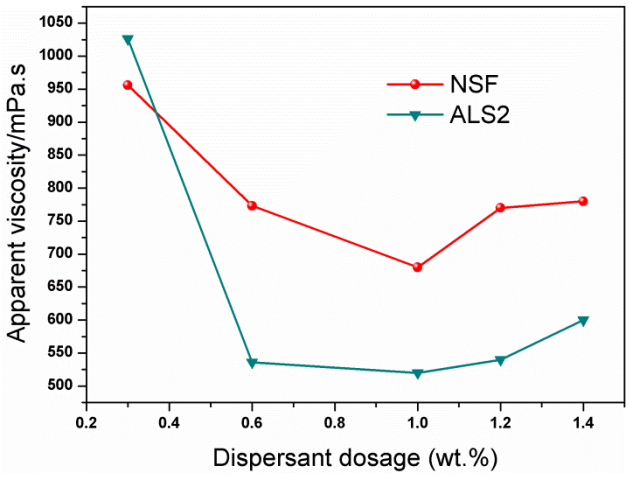


Fig. S4 Effect of dispersant dosage on the apparent viscosity of CWS with ALSs and NSF (60.0 wt.% coal content).