



**Figure S1.** Peak splitting data of aqueous Li<sub>2</sub>SO<sub>4</sub> solution with different mass fractions in O-H stretching vibration interval

**Table S1.** Sub-bands integral area and occupy of aqueous Li<sub>2</sub>SO<sub>4</sub> solution with different mass fractions in O-H stretching vibration interval.

<i>c</i> (%)	total area	sub-bands1		sub-bands2		sub-bands3		sub-bands4		sub-bands5	
		area	occupy	area	occupy	area	occupy	area	occupy	area	occupy
0.05	1356083.5	62571.9	0.0461	325330.8	0.2399	331872.1	0.2447	435236.0	0.3210	201072.7	0.1483
1.0	1314630.3	64543.0	0.0491	306006.7	0.2328	329020.8	0.2503	417981.4	0.3179	197078.4	0.1499
6.0	1230676.7	53968.8	0.0439	263040.3	0.2137	335824.5	0.2729	399490.0	0.3246	178353.1	0.1449
8.0	1217929.9	44044.0	0.0362	199650.8	0.1639	473175.2	0.3885	338370.7	0.2778	162689.2	0.1336
10.0	1205320.8	41344.6	0.0343	121585.6	0.1009	598287.0	0.4964	284763.3	0.2363	159340.3	0.1322
14.0	1189145.7	39911.0	0.0336	100192.0	0.0843	611870.0	0.5145	284221.7	0.2390	152951.0	0.1286
18.0	1127717.7	33817.4	0.0300	89083.5	0.0790	577047.4	0.5117	289027.6	0.2563	138741.8	0.1230
24.0	1081347.8	27825.6	0.0257	71810.0	0.0664	556026.6	0.5142	296743.3	0.2744	128942.4	0.1192