

DBN-based ionic liquids for wool keratin dissolution with high capability

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Supplementary Information

Synthesis and Characterization of ionic liquids

Table S1. Electronic spray mass spectrum analysis and water content of IL

ILs	cation(m/z)	negion(m/z)	water content(ppm)
[DBNE]DEP	153.1391	153.0311	964
[Emim]DEP	111.0917	153.0311	1310
[DBNM]DMP	139.1213	124.9995	1805
[Emim]DMP	111.0901	124.9992	641
[DBNH]OAc	125.1078	/	1140

¹H-NMR Analysis of ILs: (600 MHz, DMSO)

[DBNE]DEP: δ_{ppm} = 3.65 (t, 2H), 3.58(m, 4H), 3.43(m, 2H), 3.39(m, 2H), 3.03(t, 2H), 2.04(m, 2H), 1.98(m, 2H), 1.17(t, 3H), 1.05(t, 6H)

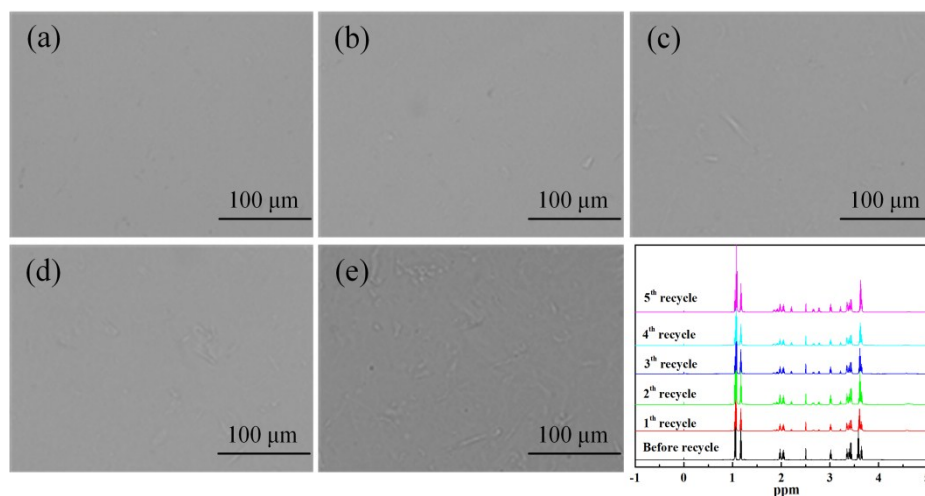
[DBNE]DMP: δ_{ppm} = 3.65 (m, 2H), 3.37(t, 2H), 3.33(t, 2H), 3.24(d, 3H), 3.10(s, 6H), 3.00(t, 2H), 2.03(m, 2H), 1.98(m, 2H)

[DBNH]OAc: δ_{ppm} = 3.57 (t, 2H), 3.35(t, 2H), 3.31(m, 2H), 3.28(t, 2H), 3.14(t, 2H), 2.80(t, 2H), 2.20(m, 2H), 2.02(m, 2H), 1.90(m, 2H), 1.80(d, 3H), 1.74(s, 3H)

[Emim]DEP: δ_{ppm} = 9.79 (s, 1H), 7.95(t, 1H), 7.85(t, 1H), 4.25(q, 2H), 3.91(s, 3H), 3.66(m, 4H), 1.43(t, 3H), 1.08(t, 6H)

[Emim]DMP: δ_{ppm} = 9.58 (s, 1H), 7.88(t, 1H), 7.82(t, 1H), 4.22(m, 3H), 3.88(s, 2H), 3.29(d, 6H), 1.42(t, 3H)

Recycling of ionic liquids



Note: All experiments are conducted at 393 K with 8% wool keratin

Fig. S1. Dissolution process of wool fiber in [DBNE]DEP after 3 h at the first time (a), second time (b), third time (c), fourth time (d), fifth time (e) and the structures of ionic liquid after every recycle.

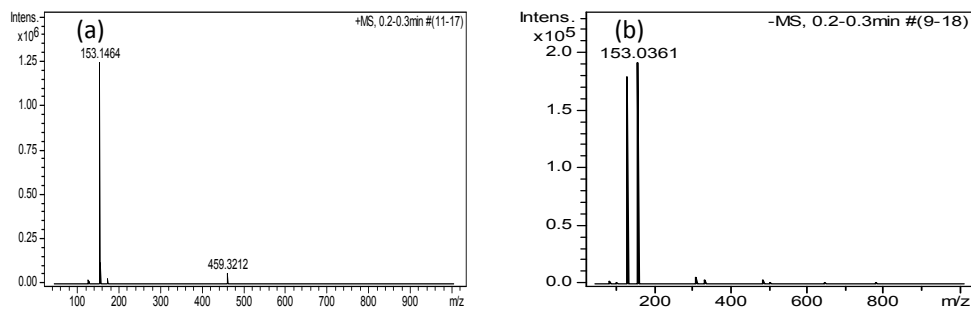


Fig. S2 Electronic spray mass spectra of cation (a) and anions (b) of 5th recycled IL.

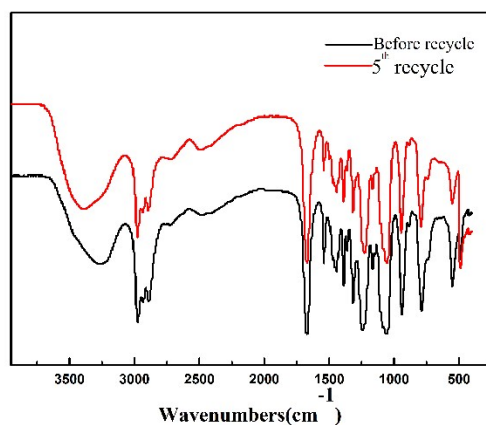


Fig. S3 FT-IR spectra of 5th recycled IL and before recycled IL.

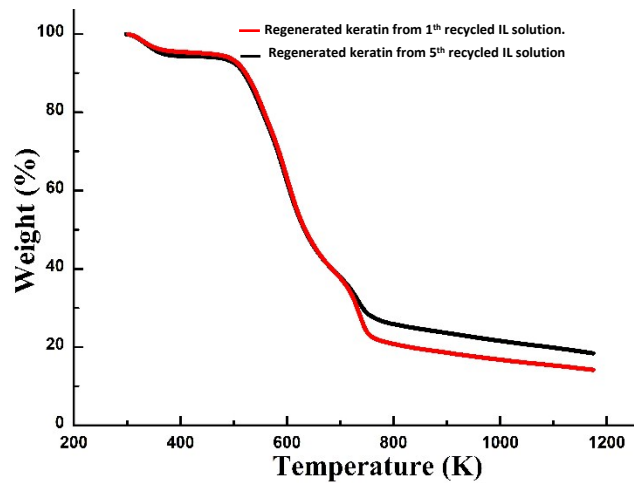


Fig.S4 TGA curves of the regenerated keratins from 5th recycled and 1st recycled ILs solutions.