Supporting Information

Al(III) and Ga(III) triflate complexes as solvate ionic liquids: speciation and application as recyclable Lewis acidic catalysts

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Gas chromatography analysis

GC analyses were performed using a Shimadzu GC-2010 Plus equipped with a ZB-50 column (30m × 0.25mm × 0.25μm film) and an FID detector.

Thermogravimetric analysis

The thermogravimetric analysis was performed for each of the prepared SILs as well as for its precursors on a thermobalance (Mettler Toledo TGA851e). Under N2 60.0 ml/min applied temperature range 25.0-600.0°C and ramp 10.0°C/min.

Procedure for synthesis of Al(NTf2)3

The Al(NTf2)3 was synthesized in a glovebox under an inert argon atmosphere (<0.6 ppm O2 and H2O). The HNTf2 (1.07 g, 3.8 mmol) was weighed into a round-bottom flask with anhydrous toluene (11 ml) and trimethylaluminum solution 2.0 M in toluene (1.25 g; 15.1 mmol) was added. The mixture was stirred in glovebox (24°C, 12 h, 200 rpm) and subsequently the solvent was evaporated at Schlenk line to obtain white solid. 27Al NMR (CDCl3) δAl :-14.8 (s), -16.2 (s), -17.6 ppm (s). 19F NMR (CDCl3) δF : -80 to -85 ppm (m).



**Figure S1.** TGA for triglyme, Al(OTf)3, Al-SILs in *χ*Al(OTf)3 = 0.33 and 0.09.



**Figure S2.** TGA for triglyme, Ga(OTf)3, Ga-SILs in *χ*Ga(OTf)3 = 0.33 and 0.09.