

Supplementary information

1 Synthesis of ionic liquid [APmim]OH

3-chloropropylamine hydrochloride (6.5g, 0.05mol) and 1-methylimidazole(4.1 g, 0.05mol) was weighed and dissolved in 50 ml acetonitrile solvent. The mixed solution was refluxed at 80 °C for 24 h with stirring. Acetonitrile was removed by rotary evaporation at 60 °C after the reaction and the liquid mixture was washed by anhydrous ethanol for three times. The solution was further concentrated by evaporation to obtain the intermediate product of ionic liquid. The anions in the intermediate product was exchanged with equal molar amount of NaOH (0.05 mol) in the mixed solvent of ethanol and water at room temperature. NaCl was removed by extraction with tetrahydrofuran (THF) and ionic liquid [APmim]OH was obtained after rotary evaporation and drying in a vacuum oven.

2 Characterization of ionic liquid [APmim]OH

The FT-IR spectrum of [APmim]OH was shown in Fig. 1(a). The absorption peak at 3448 cm^{-1} was the stretching vibration peak of hydroxyl. The absorption peaks at 3143 cm^{-1} and 3083 cm^{-1} was ascribed to stretching vibration of unsaturated C-H bond on the imidazole ring. The stretching vibration peaks at 2960 cm^{-1} , 2935 cm^{-1} and 2871 cm^{-1} were corresponded to the saturated C-H bond on the imidazole branched chain. The stretching vibration peaks of C-N and C=C bonds on the imidazole ring appeared at 1569 cm^{-1} and 1168 cm^{-1} . The weak absorption peak at 845 cm^{-1} was attributed to the out-plane bending vibration of N-H.

The $^1\text{H-NMR}$ spectrum of [APmim]OH was shown in Fig. 1(b). Three kinds of hydrogen atoms in different chemical environments on the imidazole ring corresponded to the resonance peaks where chemical shifts were 9.19ppm, 7.81ppm and 7.73ppm respectively. The resonance signals of methyl and methylene on the branched chain of imidazole ring appeared at 3.85ppm, 1.25ppm, 1.79ppm and 4.19ppm. The resonance peaks at 0.51 ppm and 3.33 ppm were attributed to amino group and hydroxyl group in the [APmim]OH molecule.

The $^{13}\text{C-NMR}$ spectrum of [APmim]OH was displayed in Fig. 1(c). The chemical environment of each carbon atom in [APmim]OH molecule was diverse. The peaks where chemical shifts were 136.77ppm, 124.56ppm and 122.90ppm were caused by carbon atoms resonance on the imidazole ring. The resonance peak at 36.80ppm corresponded to the carbon atom of methyl group in the imidazole branched chain. The resonance signals of carbon atoms of butyl on the imidazole branched chain appeared at 48.69ppm, 31.08ppm, 20.48ppm and 13.89ppm. The FT-IR and NMR characterization results indicated that 1-aminopropyl-3-methylimidazole hydroxide

had been successfully synthesized.

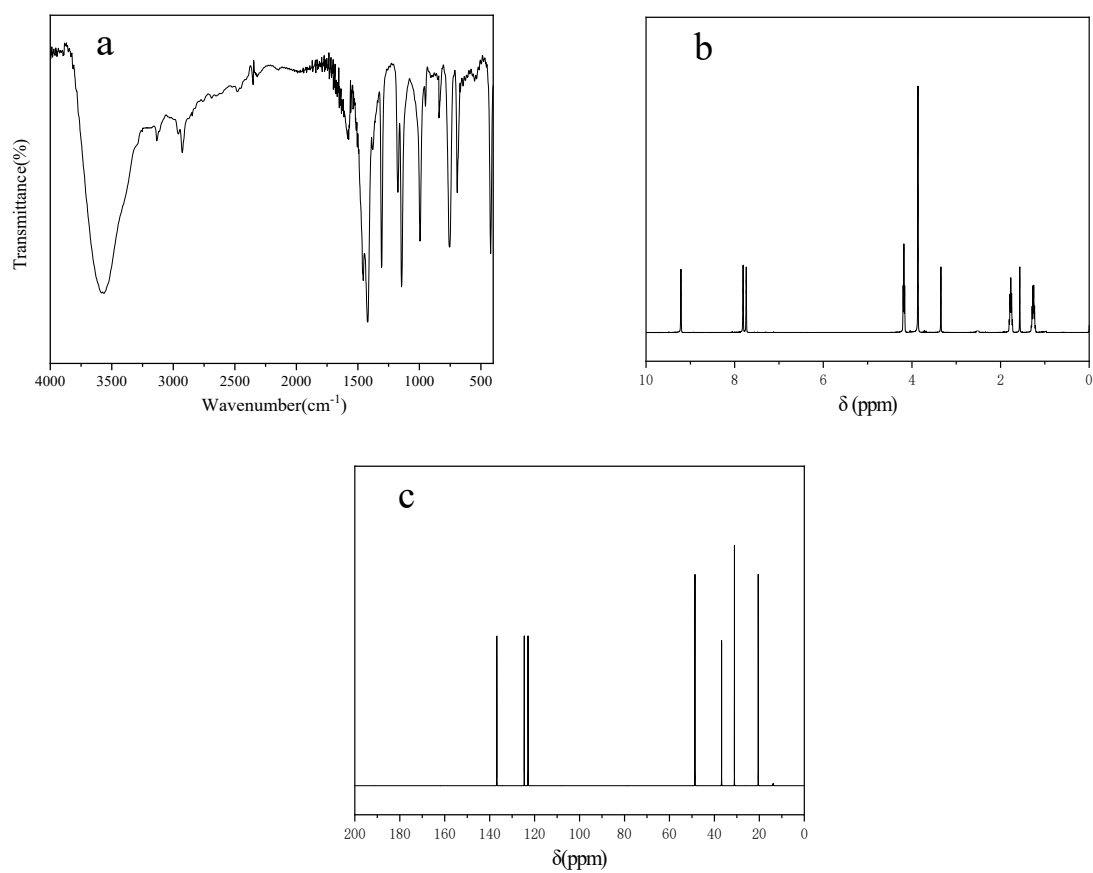


Fig. 1 FT-IR spectrum(a), $^1\text{H-NMR}$ spectrum(b) and $^{13}\text{C-NMR}$ spectrum(c) of [APmim]OH