Electronic Supplementary Material (ESI) for Nanoscale Advances.

Electronic supplementary information

Amino acid -based ionic liquids as precursors for the synthesis of chiral nanoporous carbons

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Experimental Section

Materials Synthesis

Preparation of Trimethyl Tyr-OMeBF_4

N,N,N trimethyl Phe-OMeBF_4 and N,N,N trimethyl Tyr-OMeBF_4 was synthesized by following steps. Phenylalanine methyl ester hydrochloride/ Tyrosine methyl ester hydrochloride (5.0 g) was placed in 250 mL round bottomed flask and 120 mL acetone was added. Iodomethane (18.81 g, 6 eq.) was added followed by addition of potassium hydrogen carbonate (11.63 g, 5 eq.) and the mixture (suspension) was stirred well. After 48 h the solvent was evaporated. Chloroform (20 mL) was added to the residue and the mixture was stirred well. The solvent (contains impurities) was removed by filtration (by suction). Purification: 40 mL water was added to the crude solid (~15 g; apparently contains the product and KHCO3 + KI + KCl) and the mixture was stirred at 50 ºC for 0.5 h. The mixture (suspension) was allowed to cool to RT. The white solid was filtered (suction), washed with very cold water (up to maximum 5 mL) and dried to give 7.16 g of N,N,N-timethyl-L- phenylalanine methyl ester iodide/ N,N,N-timethyl-L- tyrosine methyl ester iodide (purity confirmed by 1H NMR).

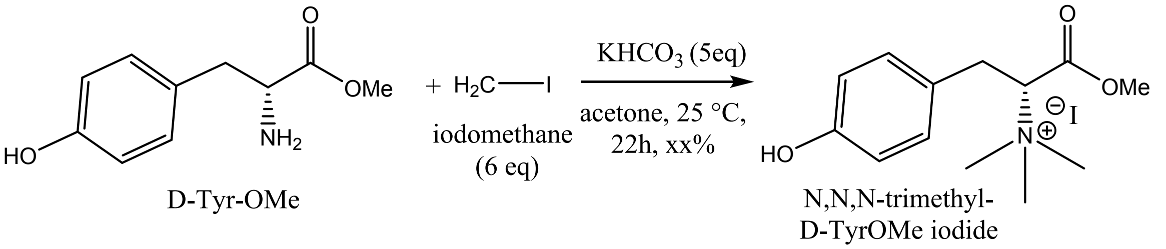
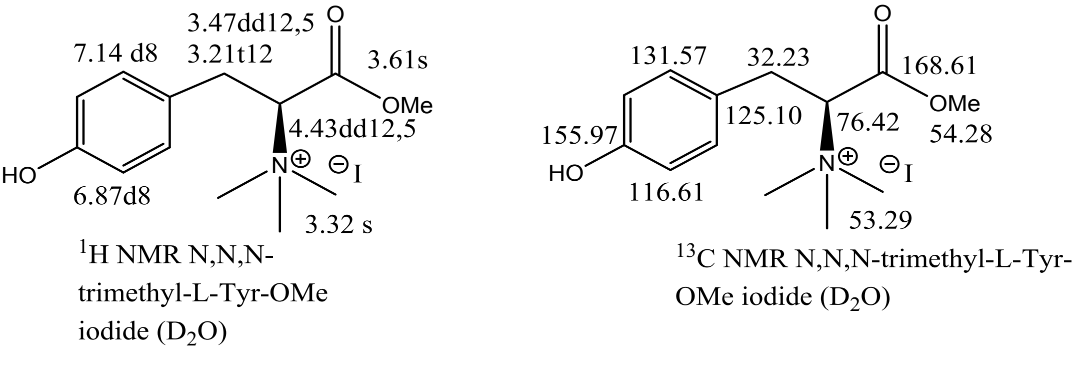


Figure S1. Pathway for the synthesis of N,N,N trimethyl Tyr-OMeBF_4 ionic liquid.

^{1}H NMR (D_2O, 400 MHz): $C_{13}H_{20}INO_2$, 365 (238+127); 7.14 (d, 2H), 6.87 (d, 2H), 4.43 (dd, J = 12, 5 Hz, 1H), 3.61 (s, 3H), 3.32 (s, 9H), 3.47 (dd, J = 12, 5 Hz, 1H), 3.21 (t, J = 12 Hz, 1H). **^{13}C NMR (D_2O, 600 MHz):** 168.61 (C), 155.97 (C), 131.57 (2xCH), 125.10 (CH), 116.61 (2xCH), 76.42 (CH), 54.28 (CH3), 53.29 (3xCH3), 32.23 (CH2).MS m/z (ES+) 238 (M+, 100). **MS m/z (ES+):** MS m/z (ES+) 238 (M+, 100).



^{1}H NMR N,N,N-trimethyl-L-Tyr-OMe iodide (D_2O)

^{13}C NMR N,N,N-trimethyl-L-Tyr-OMe iodide (D_2O)

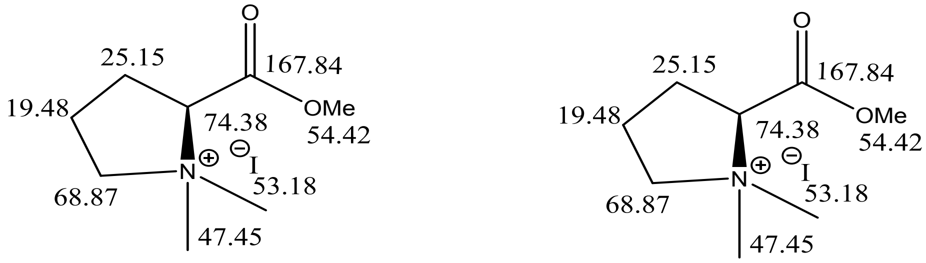
Figure S2. ^{1}H NMR and ^{13}C NMR of N,N,N trimethyl Tyr-OMeBF_4.

Preparation of Me2-L-proline methyl ester iodide

N,N dimethyl Pro-OMeBF_4 was syntheized by following steps. Potassium carbonate (6.9 g, 2 eq.) was placed in 250 mL round bottomed flask and acetonitrile (MeCN, 100 mL) was added.

The mixture was stirred vigorously for 10 min. L-proline (2.87 g) was added and the mixture was stirred for additional 10 min. Iodomethane (21.3 g, 6 eq.) was added and the mixture (suspension) was stirred well. After 72 h the mixture was filtered (to remove salts) and evaporated. The crude solid was stirred for 30 min with chloroform (25 mL) and the remained non-dissolved solid was removed. Evaporation gave 5.7 gr of product N,N-Dimethyl-L-proline methyl ester iodide (purity confirmed by ^{1}H NMR).

^{1}H NMR ($CDCl_3$,600 MHz): $C_8H_{16}INO_2$ 285 (158+127); 5.41 (t, J = 10 Hz, 1H), 4.49 (q, J = 10 Hz, 1H), 4.12 (ddd, J = 10, 8, 2 Hz, 1H), 3.86 (s, 3H), 3.76 (s, 3H), 3.27 (s, 3H), 2.80 (tdd, J = 14, 10, 5 Hz, 1H), 2.46 (qdd, J = 14, 10, 2 Hz, 1H), 2.31 (dtd, J = 14, 10, 5 Hz, 1H), 2.21 (qdd, J = 14, 8, 5 Hz, 1H **^{13}C NMR (CDCl3 ,600 MHz)**: 166.21 (C), 73.40 (CH), 67.99 (CH2), 53.62 (CH3), 52.19 (CH3), 47.52 (CH3), 24.73 (CH2), 19.11 (CH2). **MS m/z (ES+):** MS m/z (ES+) 285 (M+, 100).



^{1}H NMR N,N-dimethyl-L-ProOMe iodide (D_2O)

^{13}C NMR N,N-dimethyl-L-ProOMe iodide (D_2O)

Figure S3. ^{1}H NMR and ^{13}C NMR of N,N dimethyl Pro-OMeBF$_4$**.**

Materials Characterization

Powder X-ray diffraction

Powder X-ray diffraction (PXRD) pattern was recorded on a Bruker D8 Advance diffractometer equipped with a scintillation counter detector with Cu Kα radiation (λ = 0.15184 nm) applying 2θ step size of 0.0200 and counting time of 1s per step.

Raman spectroscopy

Raman spectra was recorded using a Witec (focus innovations)Raman Microscope operating with an objective (Nikon, 10x/0.25, ∞/-WD 6.1) and an excitation wavelength of 532 nm with an intensity of 3.5 mW.

Thermogravimetric analysis

Thermogravimetric analysis (TGA) measurement was performed using a thermo microbalance TG 209 F1 Libra (Netzsch, Selb, Germany). A platinum crucible was used for the measurement of 10 mg of a sample in synthetic air flow of 10 ml min^{-1}. The sample was heated to 1000 °C with a heating rate of 10 K min^{-1}. The data was recorded and analyzed by the Proteus (6.0.0) software package.

Supplementary Figures

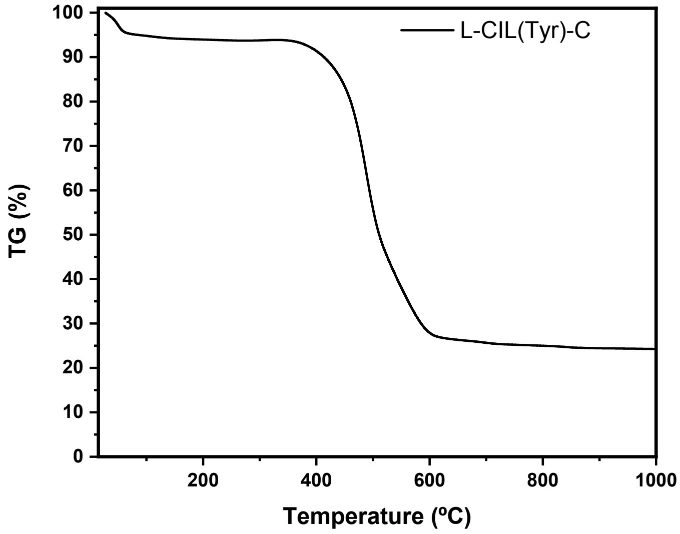


Figure S4. Thermal analysis of L-CIL(Tyr)-C under synthetic air.

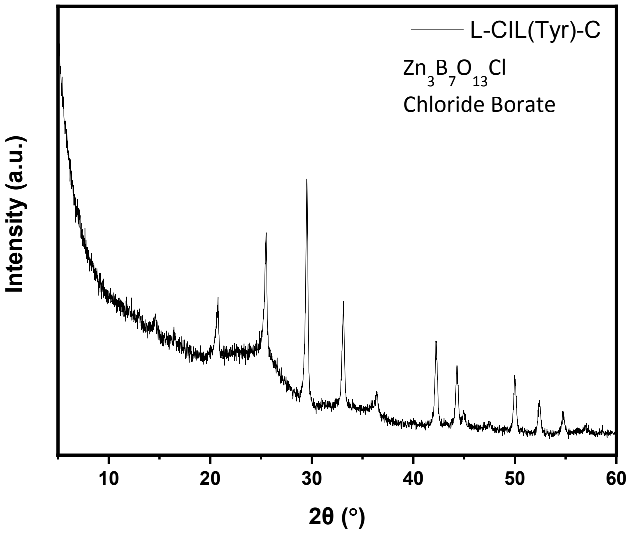


Figure S5. Powder X-ray diffraction pattern of L-CIL(Tyr)-C.

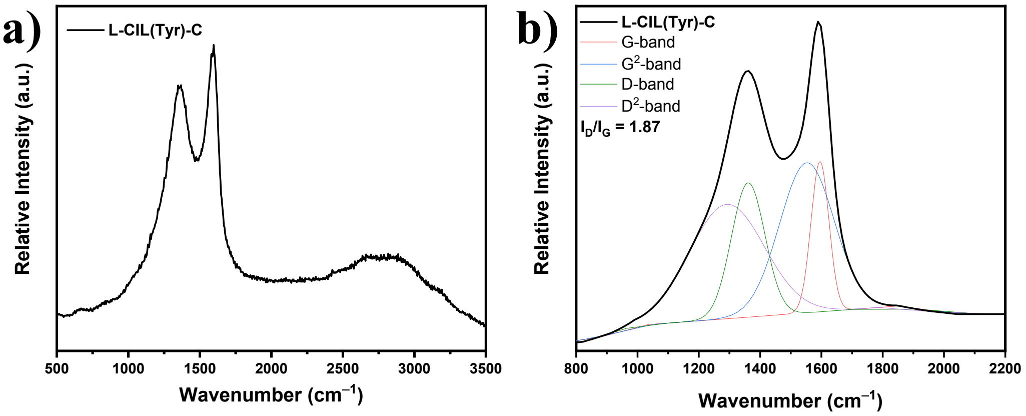


Figure S6. Raman spectrum (a), and fitted Raman spectrum (b) of L-CIL(Tyr)-C.

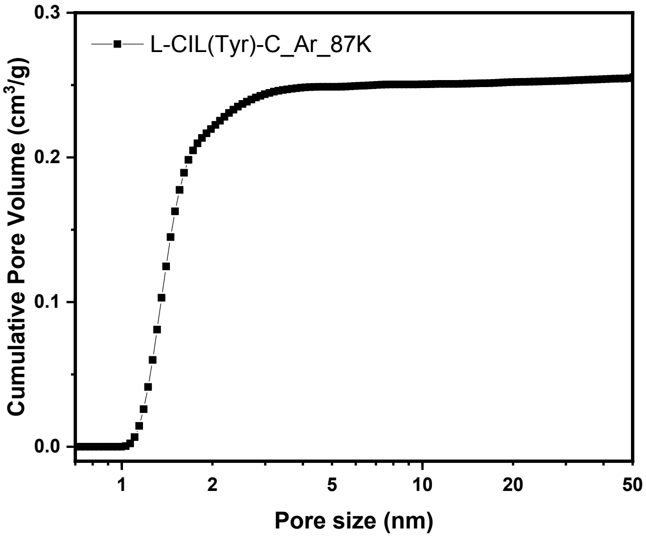


Figure S7. Cumulative QSDFT (argon on carbon with cylindrical/spherical pores at 77 K, adsorption branch kernel) pore size distribution.

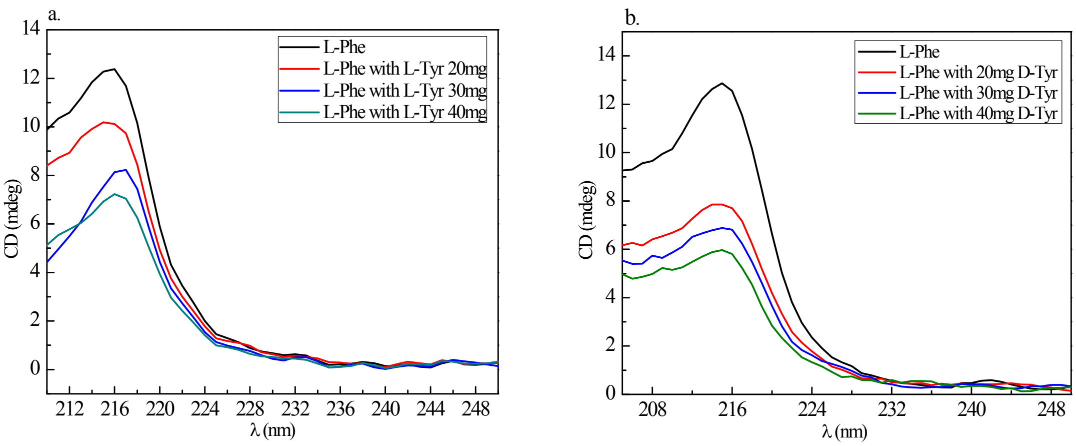


Figure S8. CD measurements for L-Phe probe without (black line) and with 20 (red), 30 (blue) and 40 (green) mg of L-CIL(Tyr)-C (a), and D-CIL(Tyr)-C (b).

Supplementary Tables

Table S1.

Porosity data summary of L-CIL(Tyr)-C.

SSA_{BET}[a] (m^2/g)	**$V_{Micro + Meso}$[b] (cm^3/g)**	**V_{Micro}[c] (cm^3/g)**	**Average Pore Size (nm)**	**Total pore volume (cm^3/g)**
624.99	0.26	0.22	1.69	0.26

[a] Specific surface area calculated using the BET equation ($p/p_0 = 0.006 – 0.078$).

[b] Micro- and mesopore volume calculated at $p/p_0 = 0.95$.

[c] Micropore volume calculated from the cumulative pore volume up to a diameter of 2 nm (QSDFT method for Ar adsorbed on carbon with cylindrical/sphere pore shape at 87 K, adsorption branch kernel).