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 KHCO$_3$ + KI + KCl) and the mixture was stirred at 50 °C 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-OMeBF₄ ionic liquid.

**1H NMR (D₂O, 400 MHz):** C₁₃H₂₀INO₂, 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). **13C NMR (D₂O, 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+): MS m/z (ES+) 238 (M+, 100).

**MS m/z (ES+):** MS m/z (ES+) 238 (M+, 100).

Figure S2. **1H NMR and **13C NMR of N,N,N trimethyl Tyr-OMeBF₄.

**Preparation of Me2-L-proline methyl ester iodide**

N,N dimethyl Pro-OMeBF₄ was synthesized 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$_8$H$_{16}$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 (CDCl$_3$, 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$_2$O)

$^{13}$C NMR $N,N$-dimethyl-L-ProOMe iodide (D$_2$O)

**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 ($\lambda = 0.15184$ nm) applying 20 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, $\infty$/-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.

<table>
<thead>
<tr>
<th>SSA_{BET}^{[a]} (m^2/g)</th>
<th>V_{Micro + Meso}^{[b]} (cm^3/g)</th>
<th>V_{Micro}^{[c]} (cm^3/g)</th>
<th>Average Pore Size (nm)</th>
<th>Total pore volume (cm^3/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>624.99</td>
<td>0.26</td>
<td>0.22</td>
<td>1.69</td>
<td>0.26</td>
</tr>
</tbody>
</table>

[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).