### Captions for Supplementary Figures 1S – 3S

### Figure 1S. Absorbance spectra of DHB and DHB-C12H25. Panel A: Solution spectra of DHB (50 M) in 0.1 M phosphate buffer (pH 7.0; blue line) and 0.1 M HCl (red line). Panel B: Soldi-state spectra of the triethylammonium salt of DHB-C12H25 (blue line) and DHB-C12H25 (red line). The salt was obtained by mixing equimolar solutions of DHB-C12H25 and Et3N in CH2Cl2 followed by rotor-evaporation of the solvent at 30 oC (200 Torr). Both the acid (white paste; 3 mg) and its salt (viscous liquid; 3 mg) were layered on the walls of quartz cuvettes by friction with a cover-slip glass. Spectra were recorded on a Helios Alpha UV-Vis spectrophotometer (Thermo Scientific. Pittsburgh, PA).

**Figure 2S.** **MALDI-MSI of near serial** **sections rat brain tissue coated with DHB and** **DHB-C12H25.** Three serial sections of rat brain tissue were cut and the middle section was stained with H&E (panel A). The first and third near serial sections were coated with either DHB (panel B) or DHB-C12H25(panel C). The dentate gyrus (DG) region from the left hemisphere was subsequently analyzed with MALDI-MSI (panels B and C). MALDI imaging showed a more continuous distribution of the ion at *m/z* 806 with DHB-C12H25than with DHB.

**Figure 3S**. **Optical image of a rat brain tissue slice coated with DHB-C12H25.** A section of rat brain tissue was coated with a 30mM solution of DHB-C12H25 (panel A) as described in Materials and Methods and differential interference contrast (DIC) microscopy was performed on the tissue section. A montaged DIC image indicated that the matrix coating did not affect the tissue structure. A section from the same stereotaxic coordinates stained with H&E (panel B) is provided for comparison.