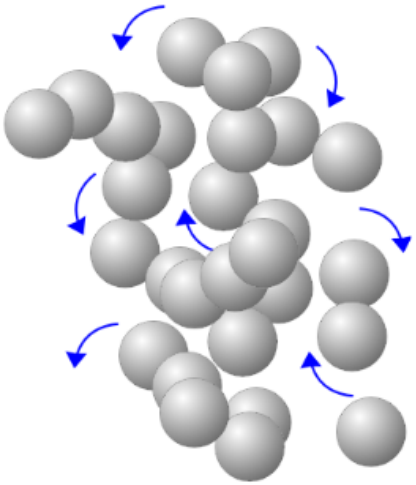
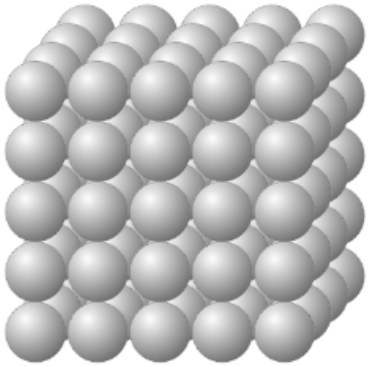
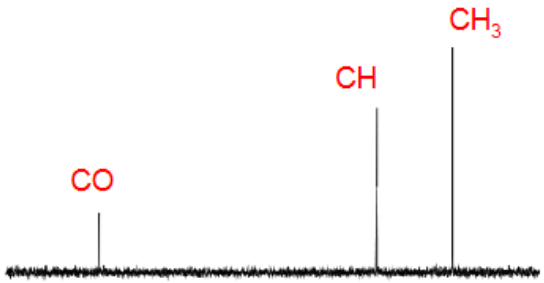
Motion in NMR

Solution



Solid



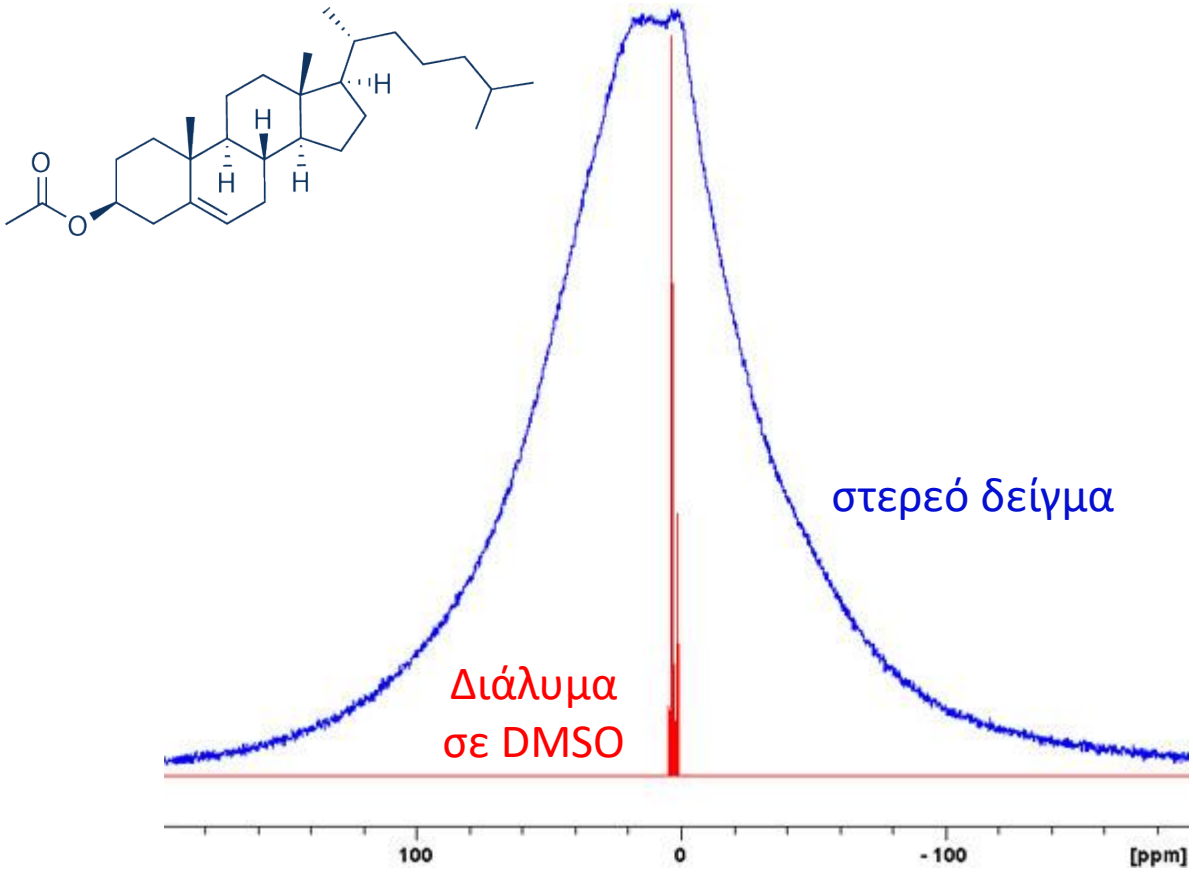


^{13}C NMR of alanine in solution

^{13}C NMR of solid alanine

http://www.solidstatenmr.org.uk/lectures_files/pdfs/Motion.pdf

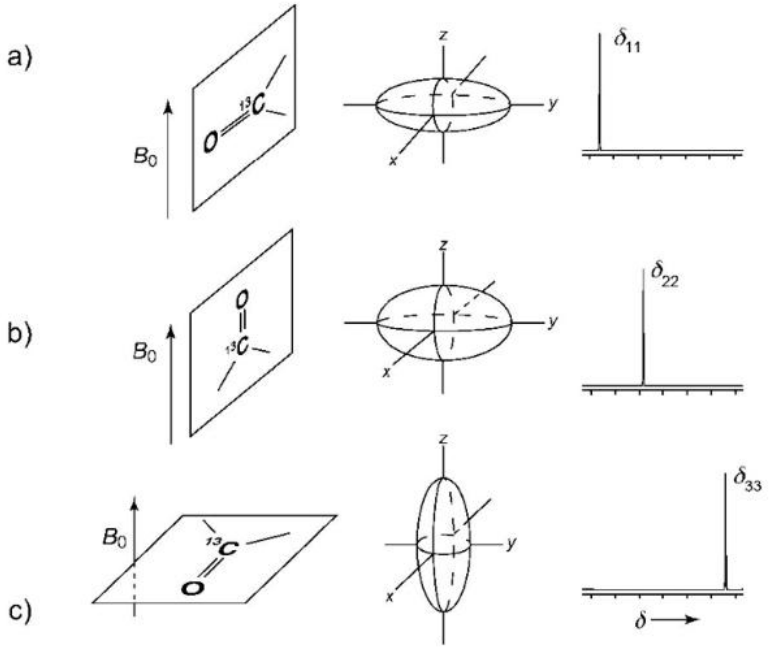
^{1}H NMR spectrum of cholesteryl acetate



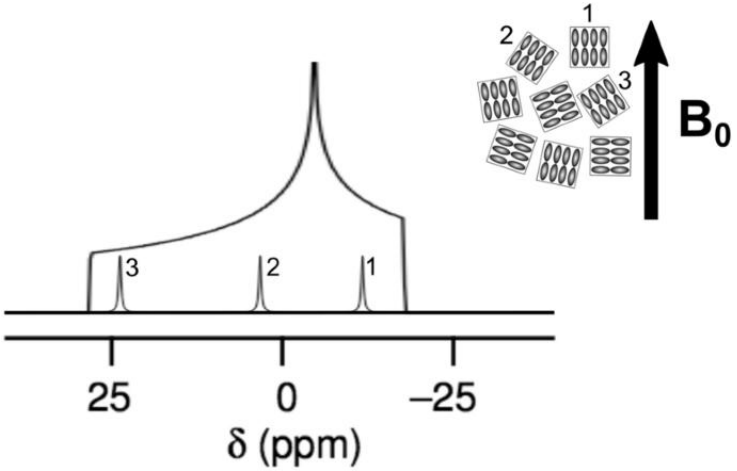
http://chem.ch.huji.ac.il/nmr/techniques/solid/solid.html

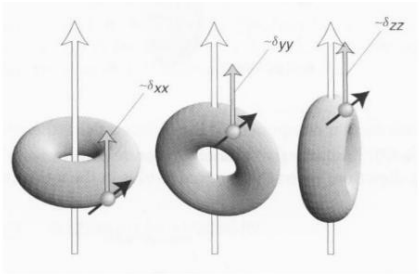
Solid state NMR

Ανισοτροπία της χημικής μετατόπισης σε στερεά



Pake pattern





Elements of the Chemical Shift Tensor

http://web.mit.edu/fbml/winterschool2008/talks/Tue3-Rienstra-Chemical shift anisotropyandmultidim recoupling.pdf

Αλληλεπιδράσεις δίπολο δίπολο μεταξύ πυρήνων σε στερεά

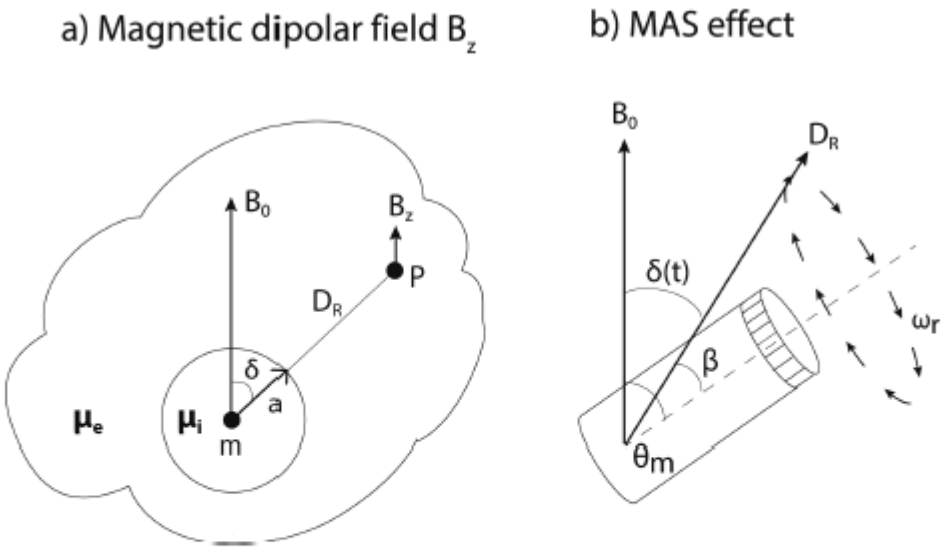
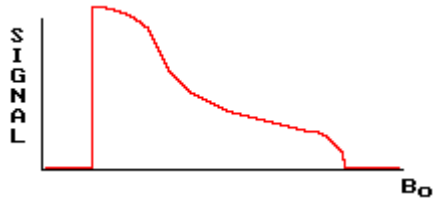
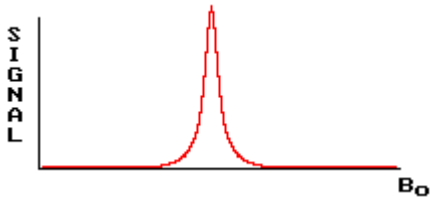


Figure 5.1 (a) The magnetic dipolar field B_z at point P of a sample induced by a magnetic moment m under the external magnetic field B_0. δ is the angle between B_0 and the dipolar vector $\mathbf{D}_R$, which depends on a distance R from m. (b) The MAS effect on the dipolar interaction, where δ becomes a time-dependent component with magic-angle θ_m and β angle between the rotation axis and $\mathbf{D}_R$ [eqn (5.4)].



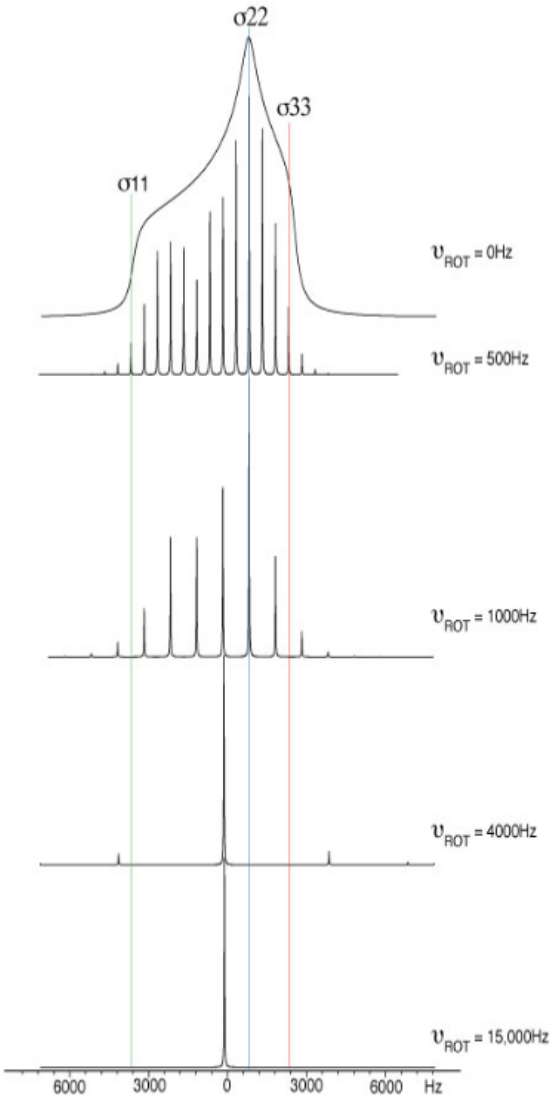
στερεό δείγμα



υγρό δείγμα

$$B_z = -\frac{\Delta\chi}{3}\frac{a^3}{R^3}B_0\left(3\cos^2\delta - 1\right)$$

Ταχύτητα περιστροφής στη μαγική γωνία



Spinning Sidebands under MAS

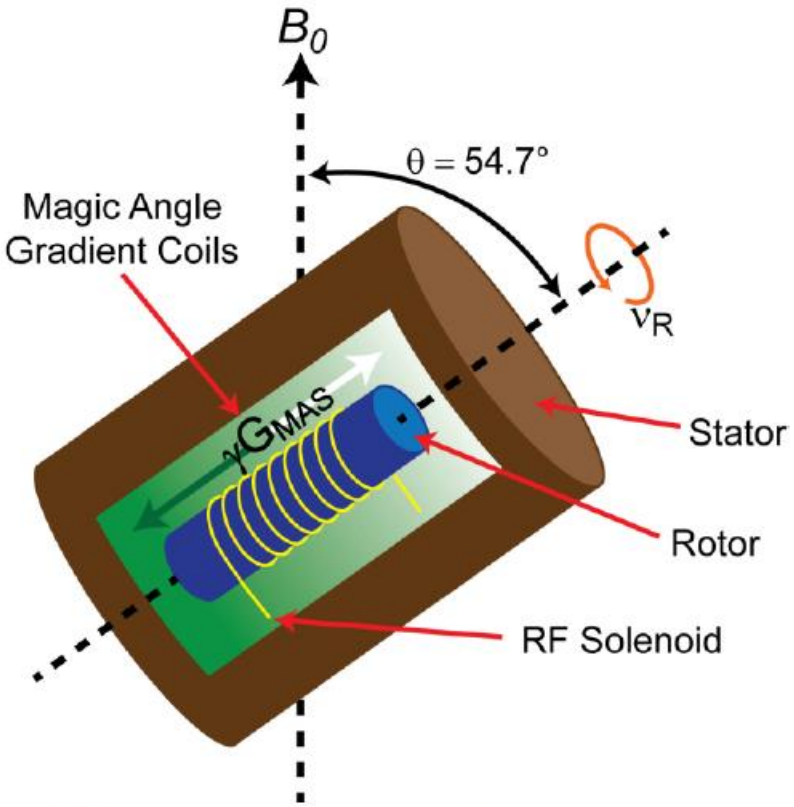


Figure 1. Schematic of a HR-MAS stator with a magic angle gradient along the rotor spinning axis.

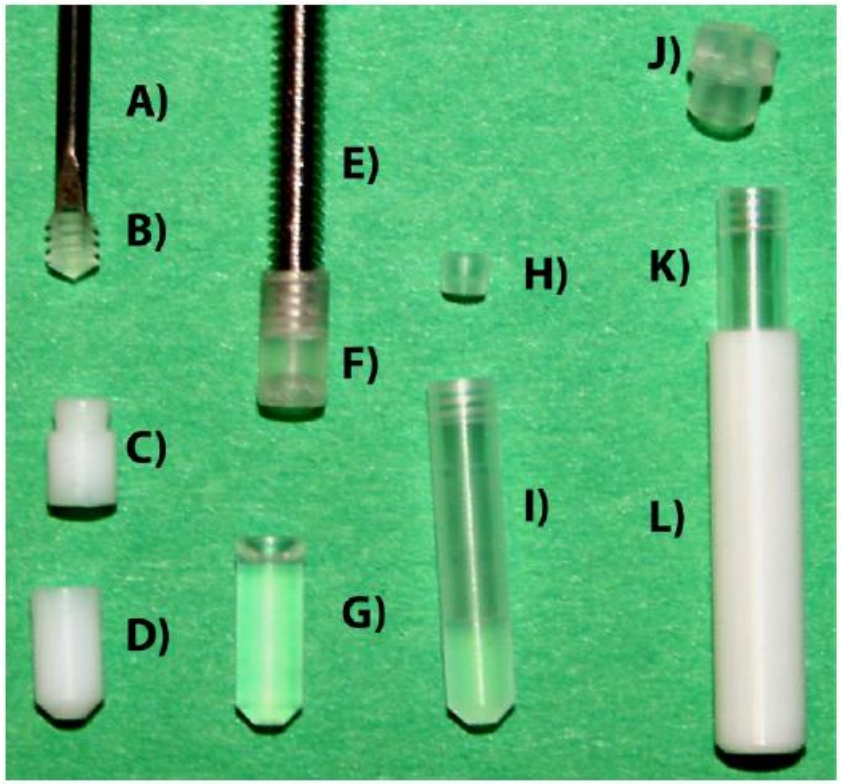


Figure 4. The tools and inserts used for HR-MAS NMR. These include A) the specialized tool for screw cap insertion, B) the sealing screw cap, C) the upper Teflon® insert, D) lower Teflon® insert for 30 μL volume, E) screw for insertion/extraction of top insert, F) top Kel-F® insert, G) bottom Kel-F® insert for 12 μL sample volume, H) plug for disposable insert, I) disposable 30 uL Kel-F® insert, J) 4 mm rotor cap, K) disposable inserted partially in a 4 mm rotor, L) 4 mm zirconia MAS rotor. All these parts are for the Bruker HR-MAS system, and may vary between vendors.

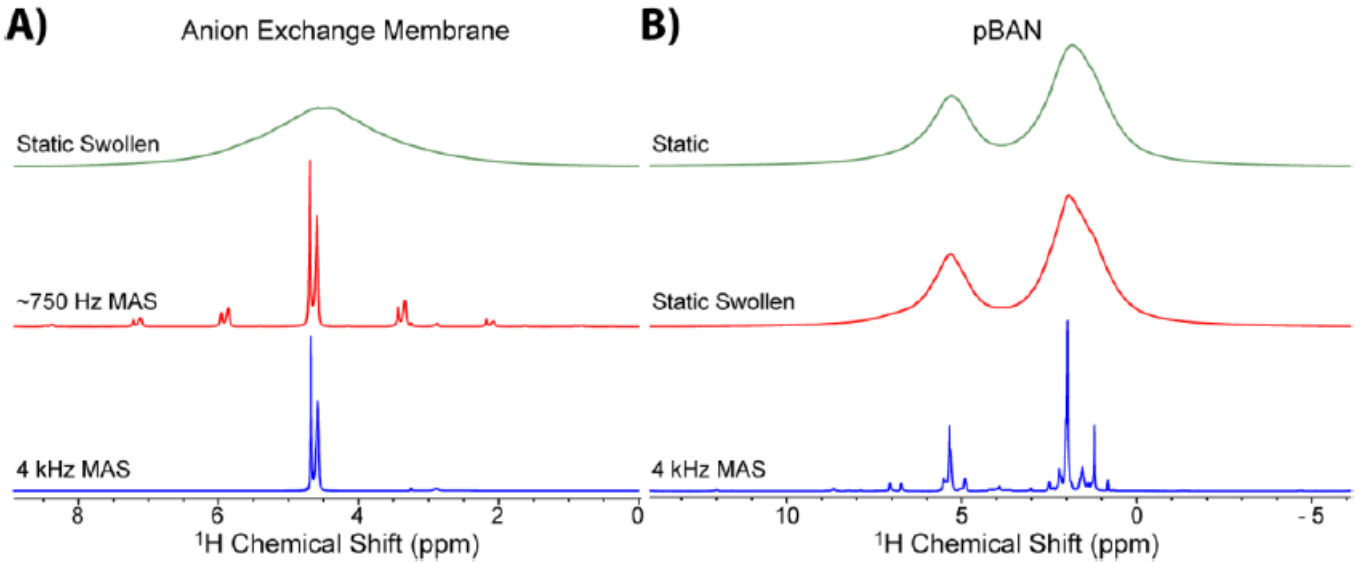


Figure 2. The improved resolution observed using ^{1}H HR-MAS NMR for the A) methanol swollen anion exchange membrane, and B) the $CDCl_3$ swollen pBAN (polyButadiene-AcryloNitrile) polymer.

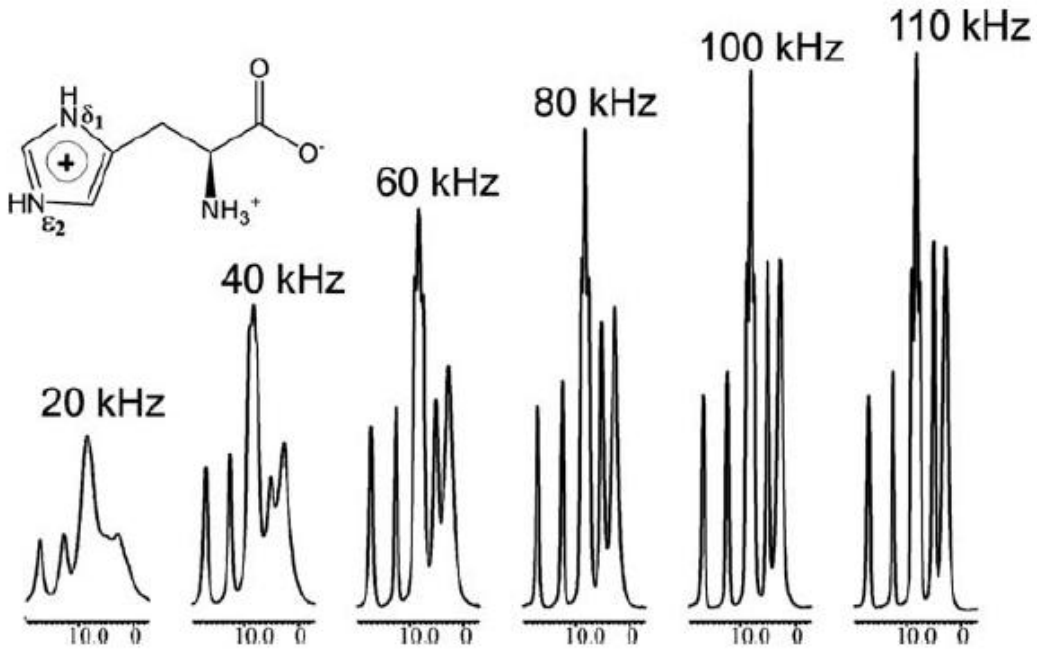
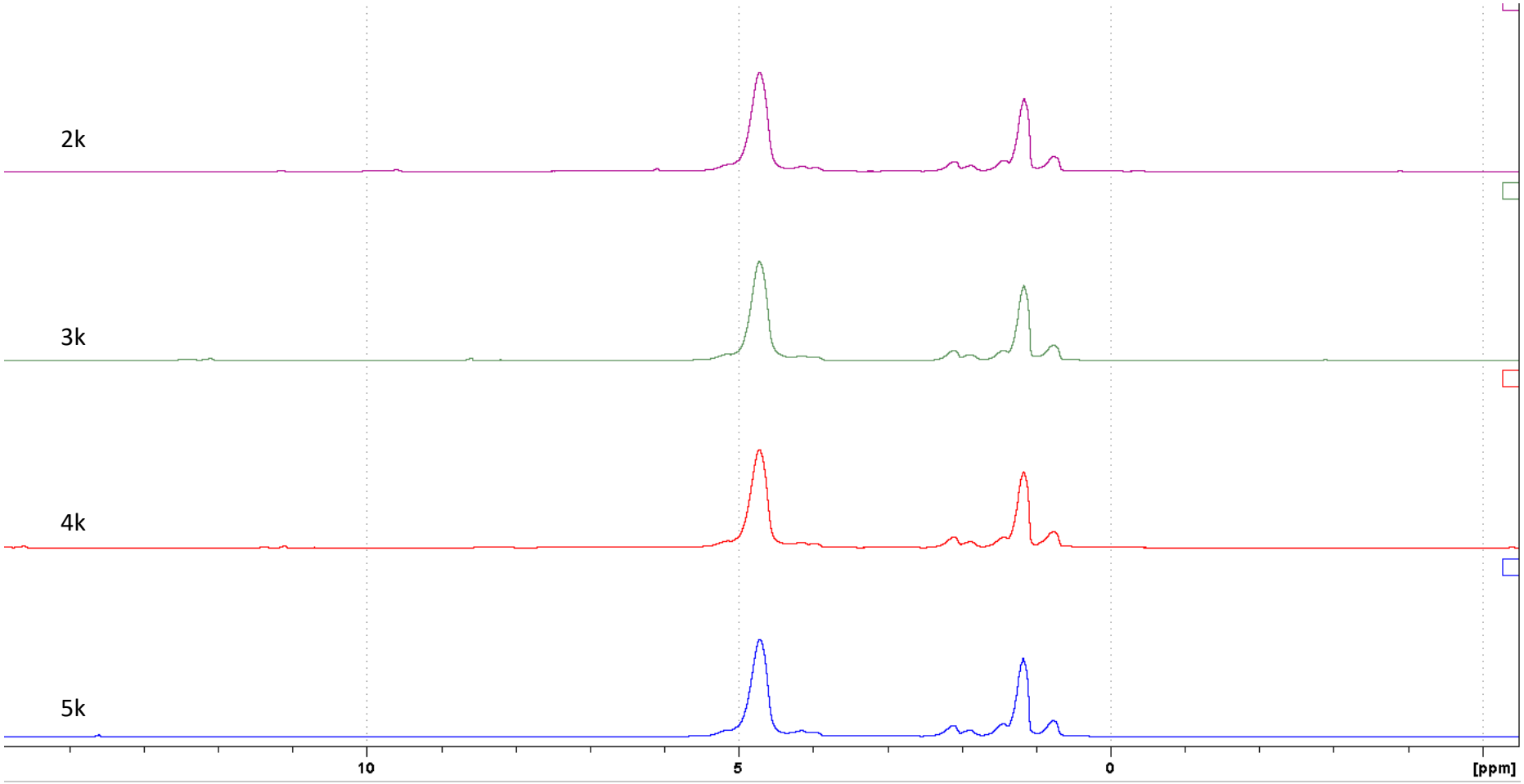
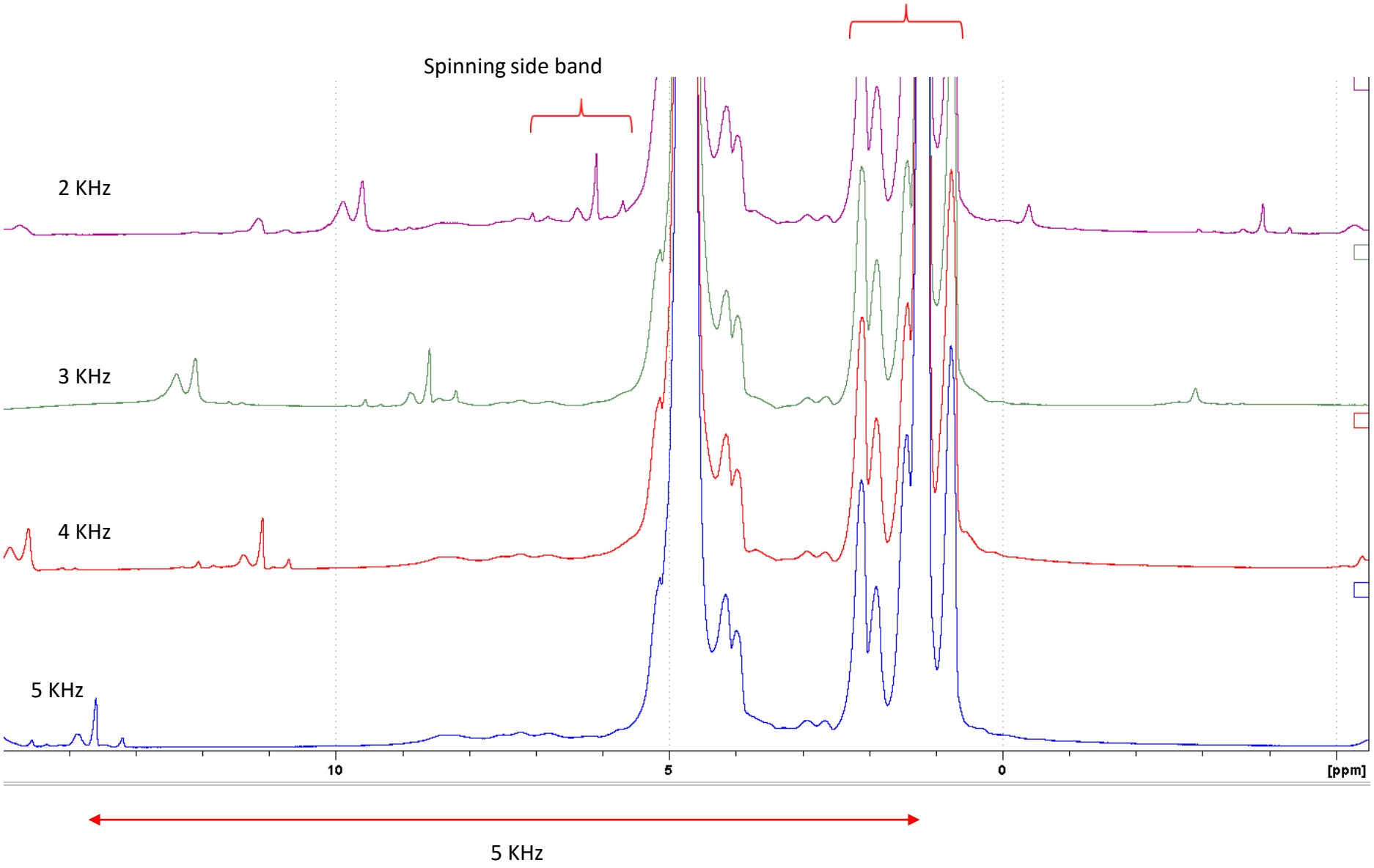


Figure 1.1 ^{1}H NMR spectra of L-histidine · HCl · H_2O under ultrafast MAS at a magnetic field $B_0 = 14.1$ T.

Solid state ^{1}H HR-MAS NMR spectra of graviera at different MAS speeds



Solid state ^{1}H HR-MAS NMR spectra of graviera at different MAS speeds



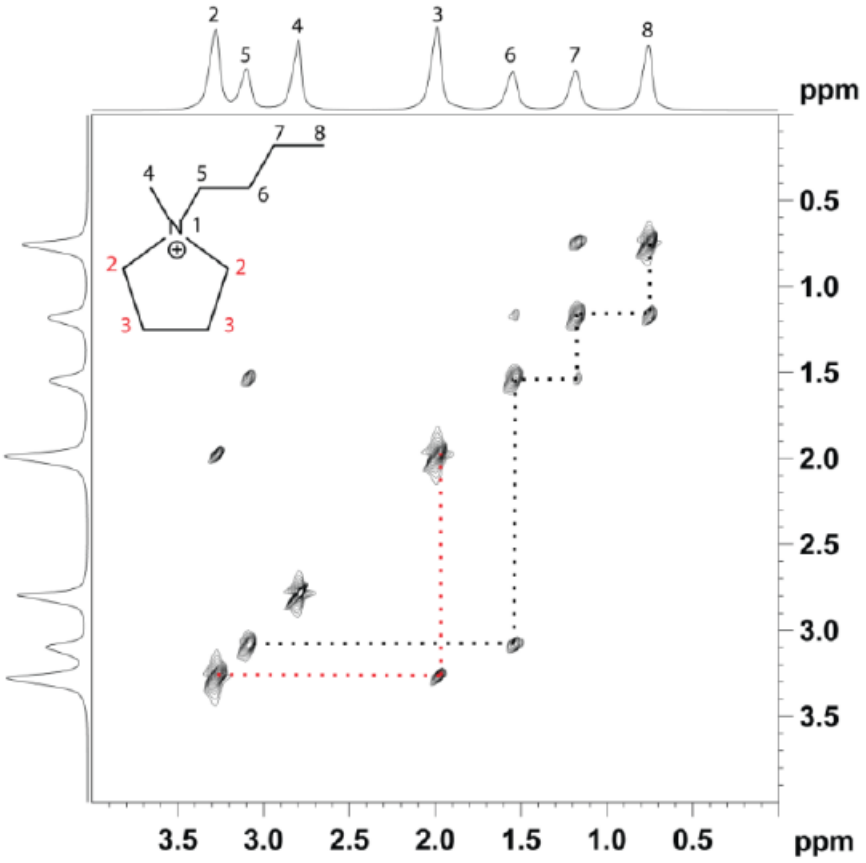


Figure 3. The gradient 2D ^{1}H HR-MAS NMR COSY spectrum for the ionic liquid $[MBPyrr]^{+}[TFSI]^{-}$ adsorbed into an inorganic aluminum oxide membrane. Even though the individual *J* couplings were not resolvable, these types of correlation experiments can still be realized under HR-MAS.

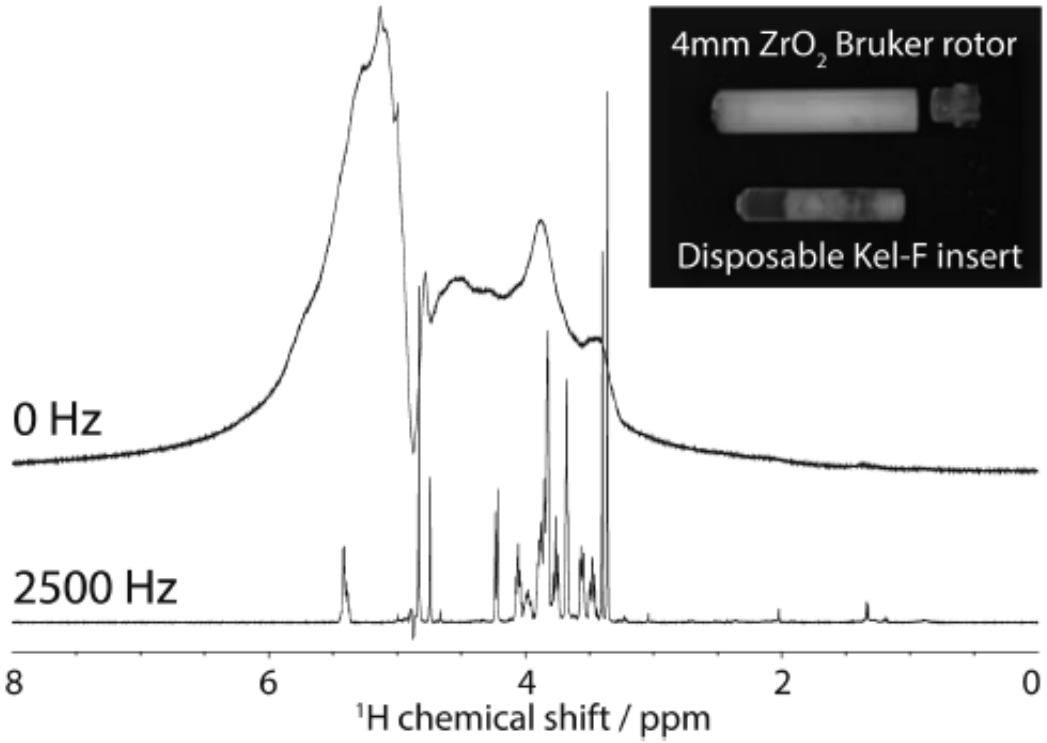
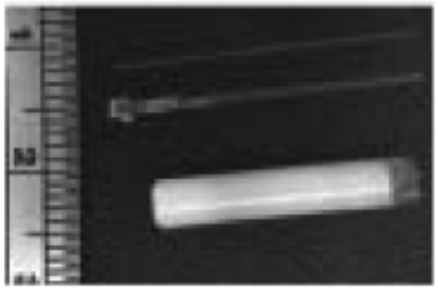
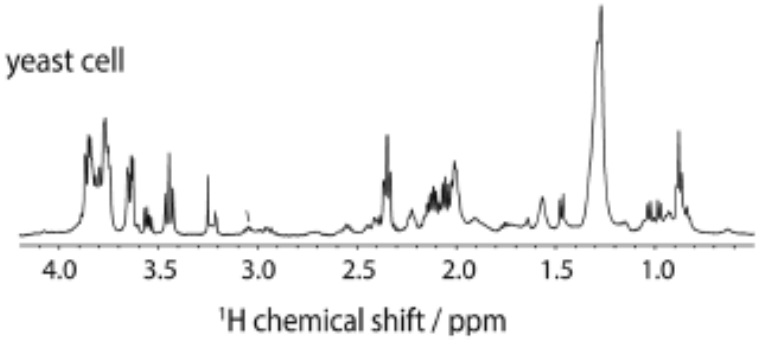


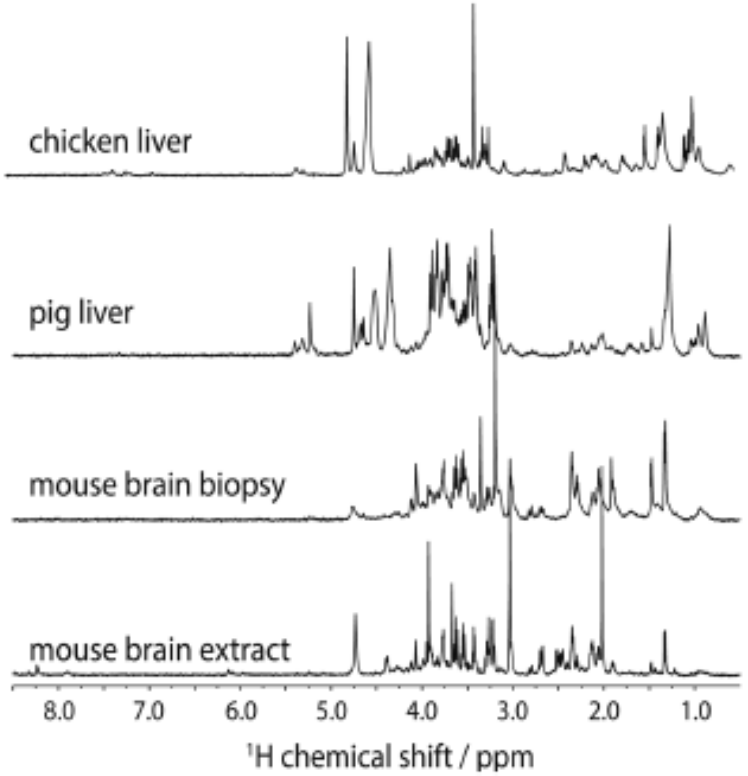
Figure 5.2 ^{1}H HR-MAS spectra of 10 mg rat brain tissue. The NMR spectra were recorded with a t_2-cpmg experiment at 500 MHz at 285 K under different MAS conditions: (top) under a non-sample-spinning condition at 0 Hz, and (bottom) at a sample-spinning of 2500 Hz. The tissue was packed inside a standard Bruker disposable Kel-F insert, which is used to enhance the sampling throughput and spectral repeatability.

a) HR-MACS µcoil
(sample-mass 250 µg)





b) 1 mm HRµMAS probe
(sample-mass 490 µg)



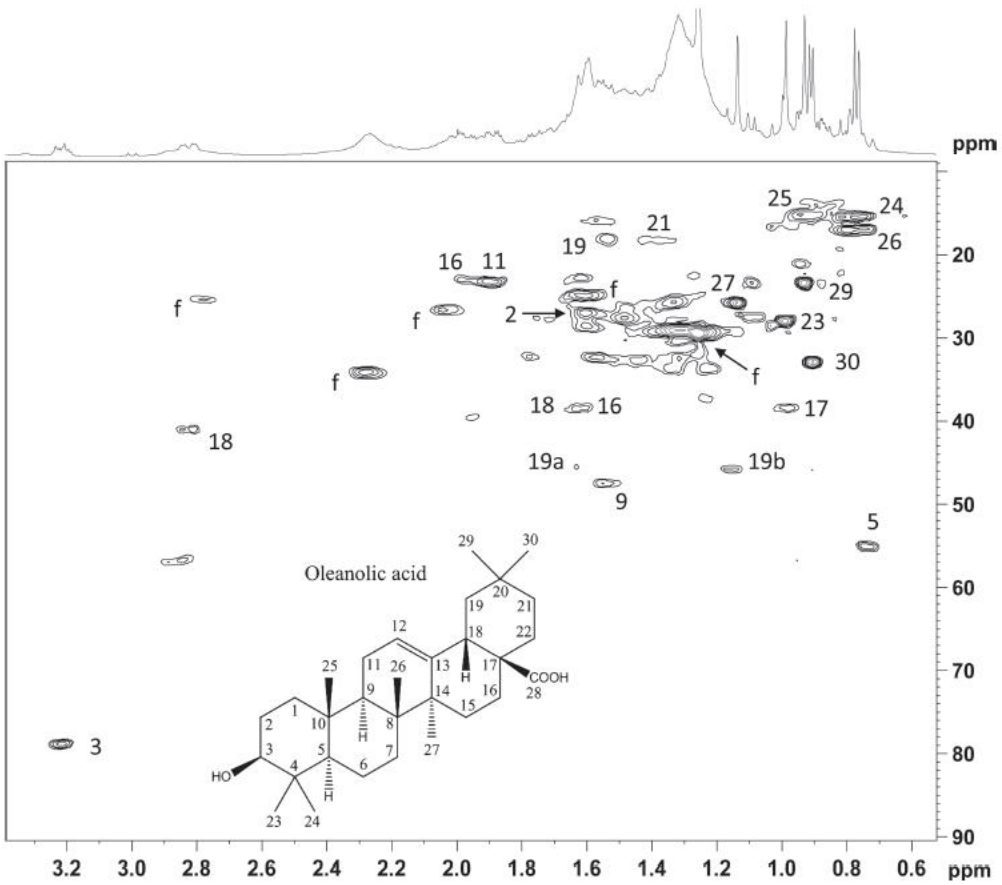


Figure 2 *HR-MAS ^{1}H-^{13}C gHSQC 2D NMR spectrum of olive leaves of Koroneiki variety. Numbers correspond to oleanolic acid protons, while f denotes fatty acid signals.*

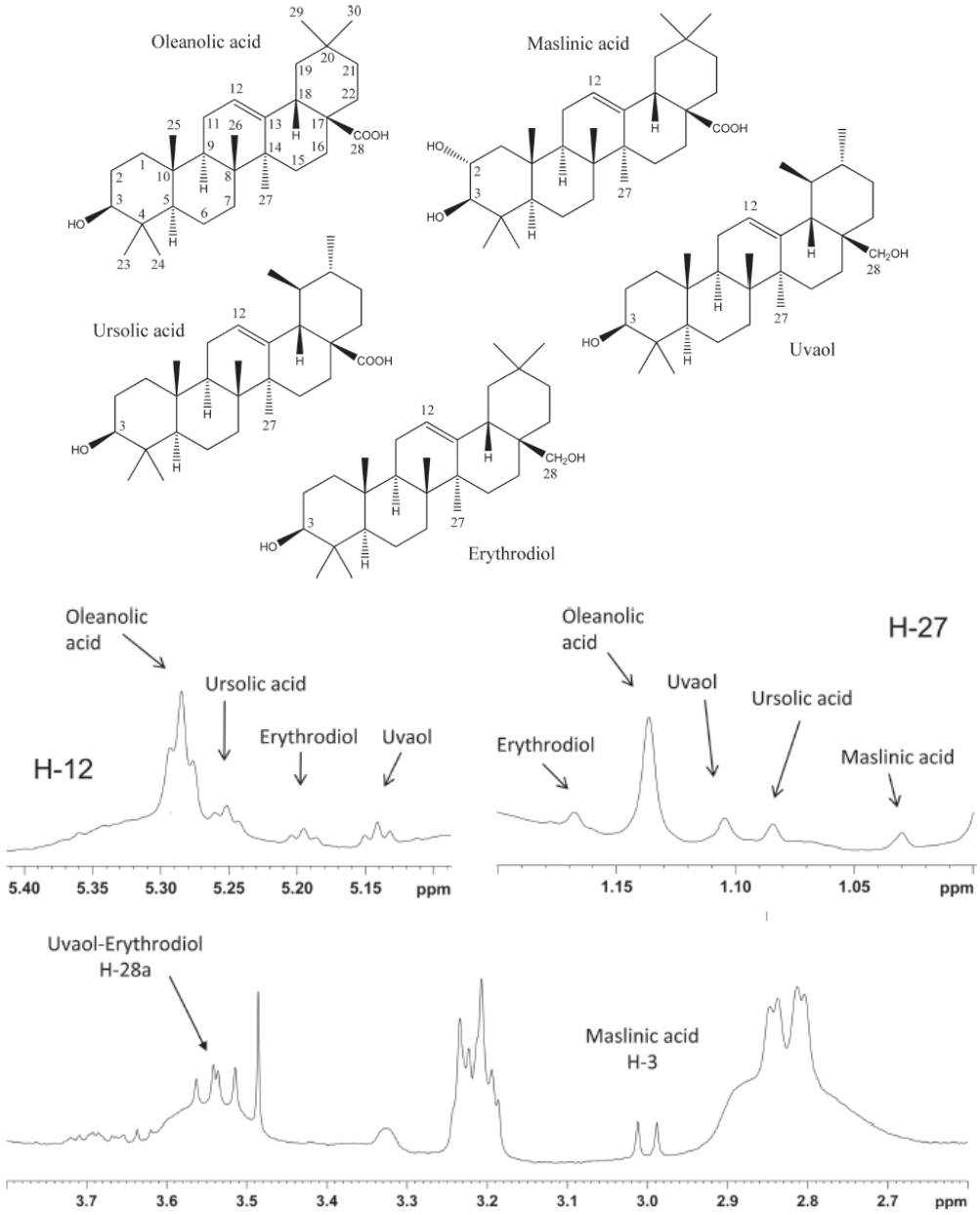
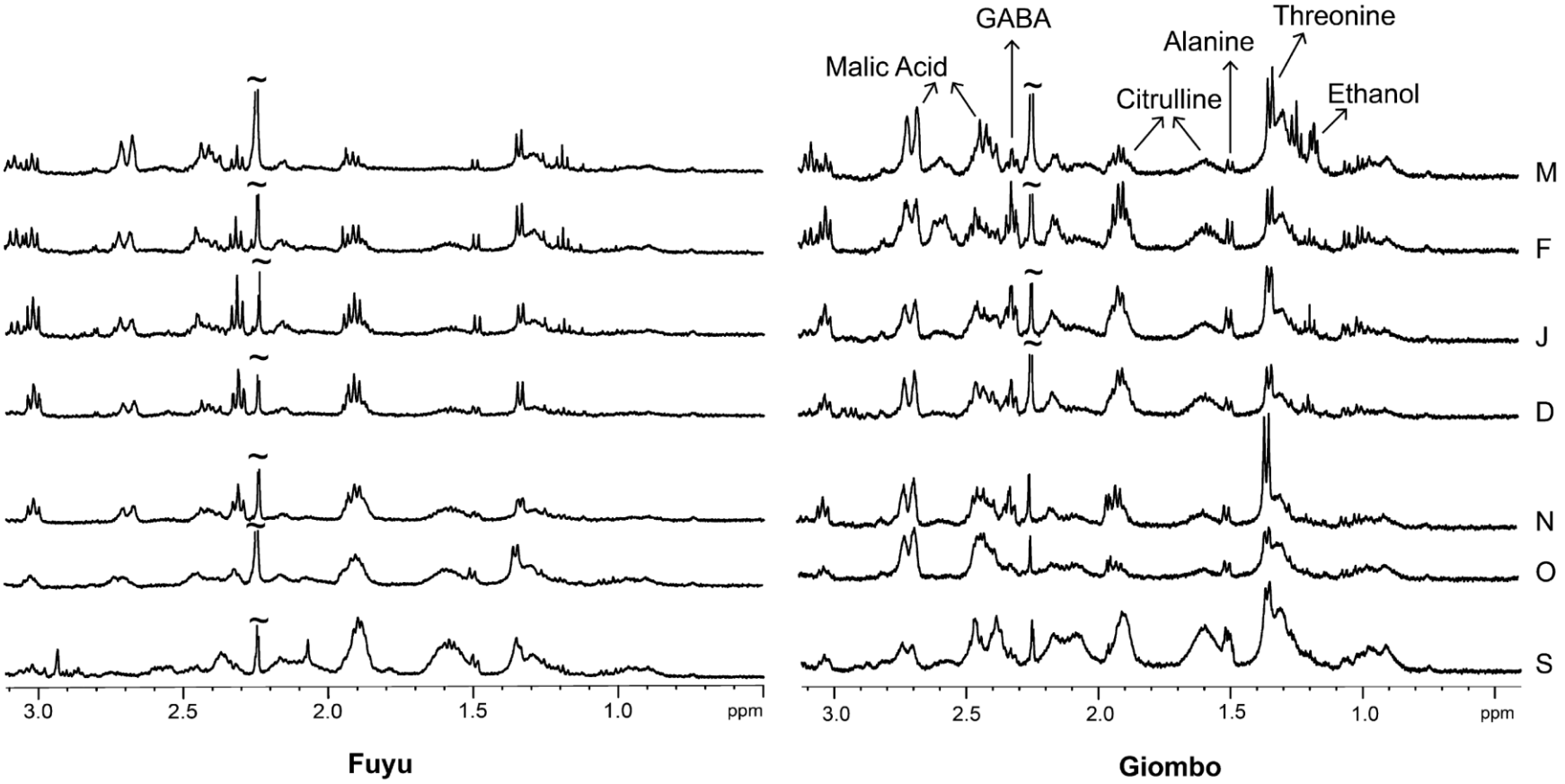


Figure 3 *Expansions of the ^{1}H HR-MAS NMR spectrum of olive leaves: vinyl proton H-12 (top left), methyl group H-27(top right), hydroxyl region (bottom).*



400 MHz HR MAS ^{1}H NMR spectra of persimmon during the process of development (from September (S) to March (M)).

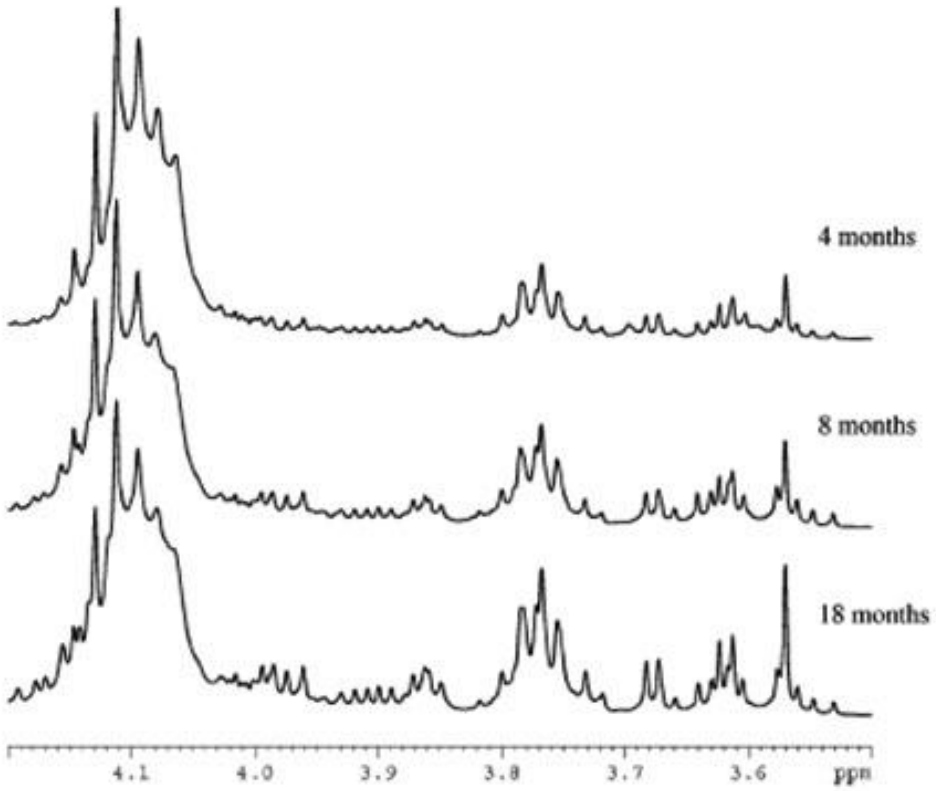
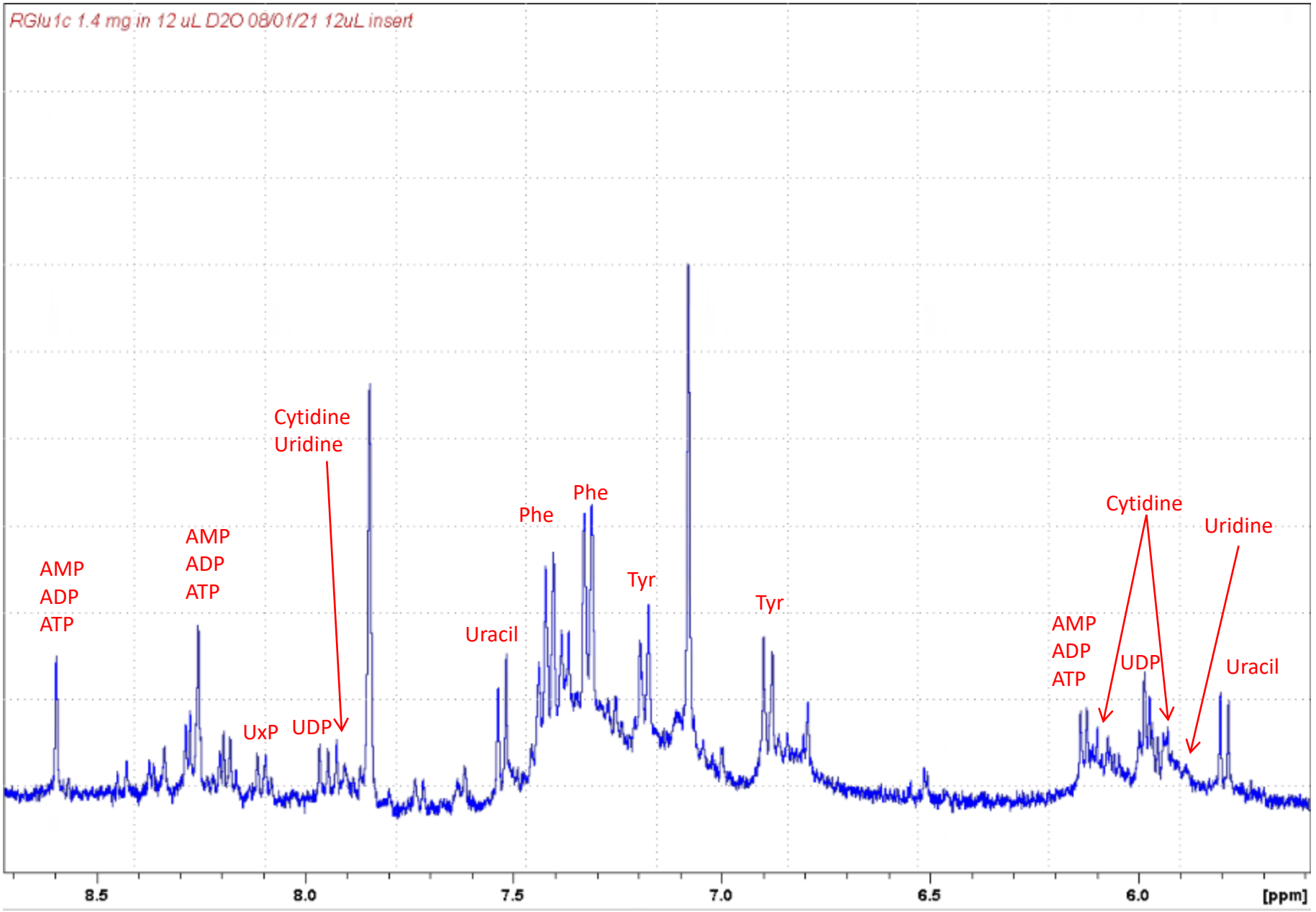
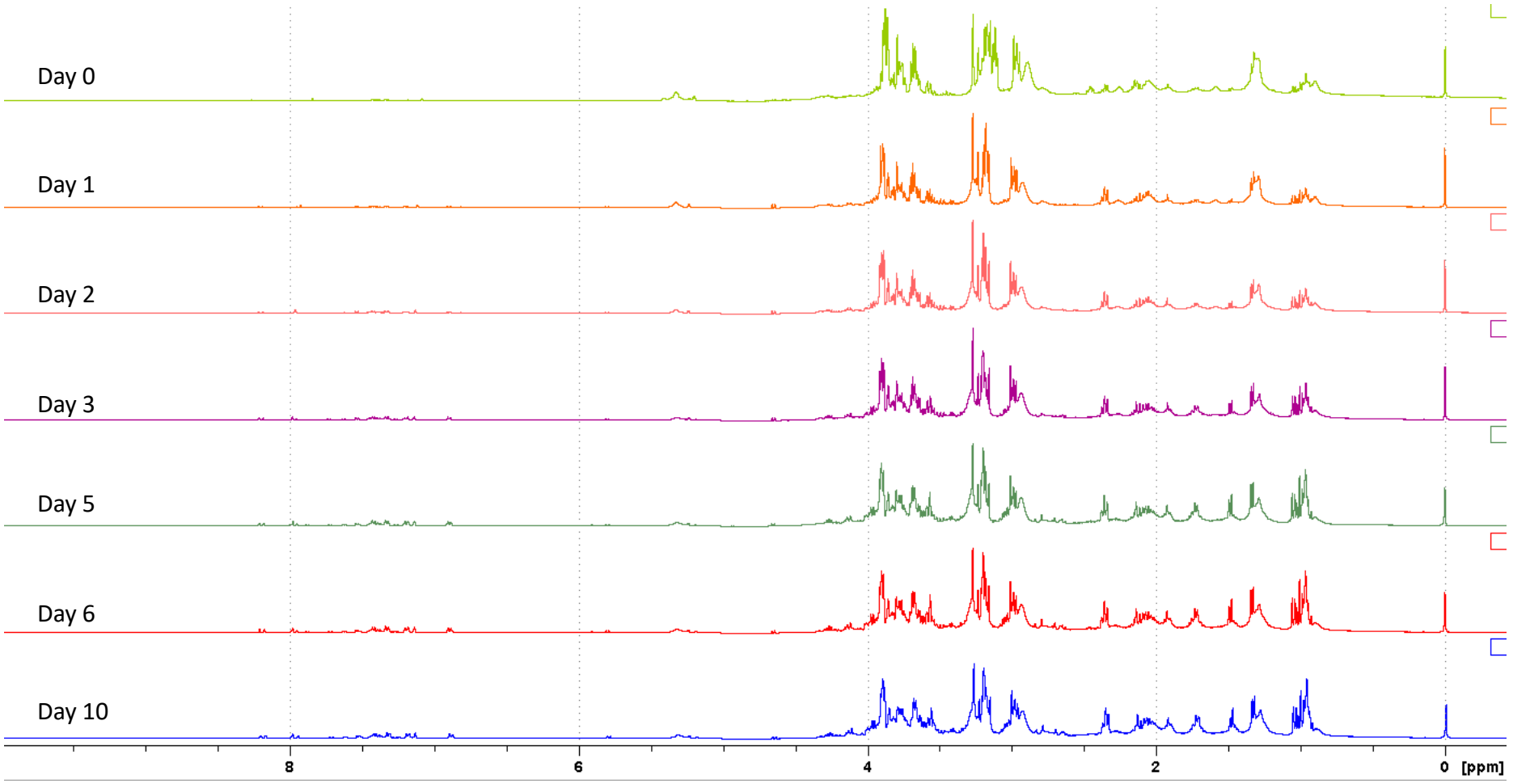


Figure 2. 1H HRMAS NMR spectrums of Permigiano Reggiano cheese [12]

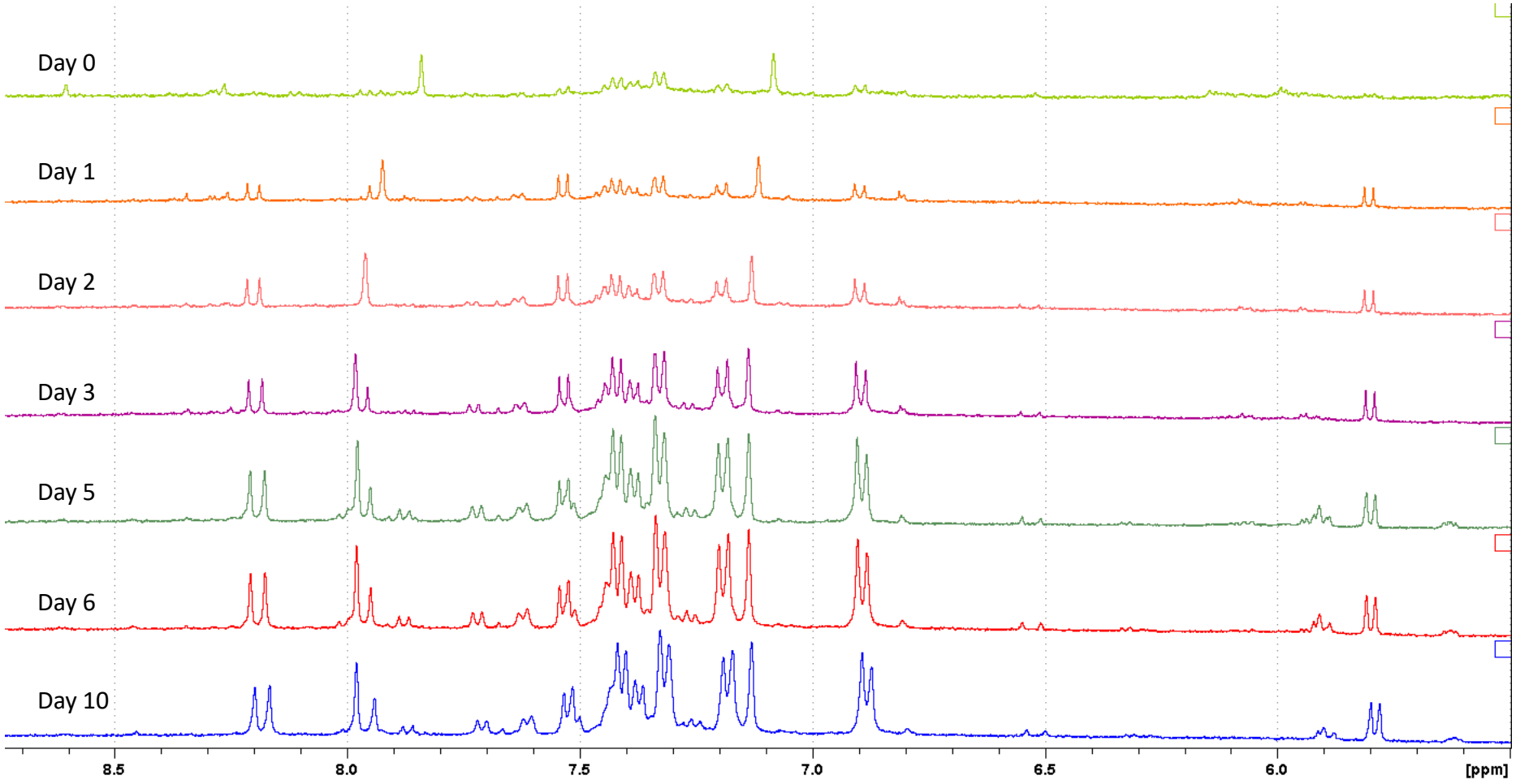
HR-MAS Solid state ^{1}H NMR spectra of whole cells



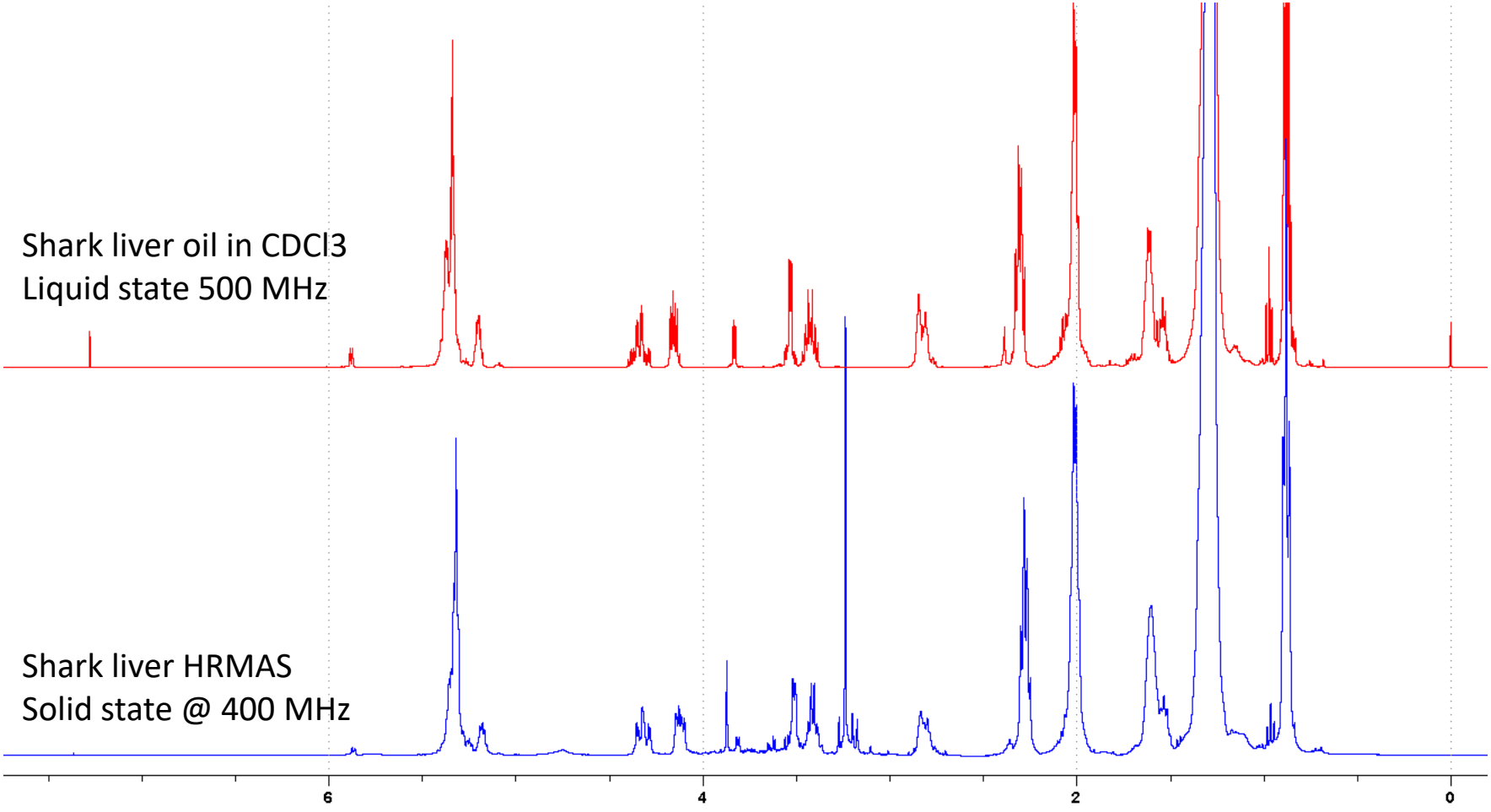
HR-MAS Solid state ^{1}H NMR spectra of whole cells



HR-MAS Solid state ^{1}H NMR spectra of whole cells



Solid state ^{1}H HR-MAS NMR spectra of shark liver



Olives aromatic region, HR-MAS vs liquids