Supporting Information

Molecular Level Understanding of Biological Systems with High Motional Heterogeneity in Its Absolute Native State

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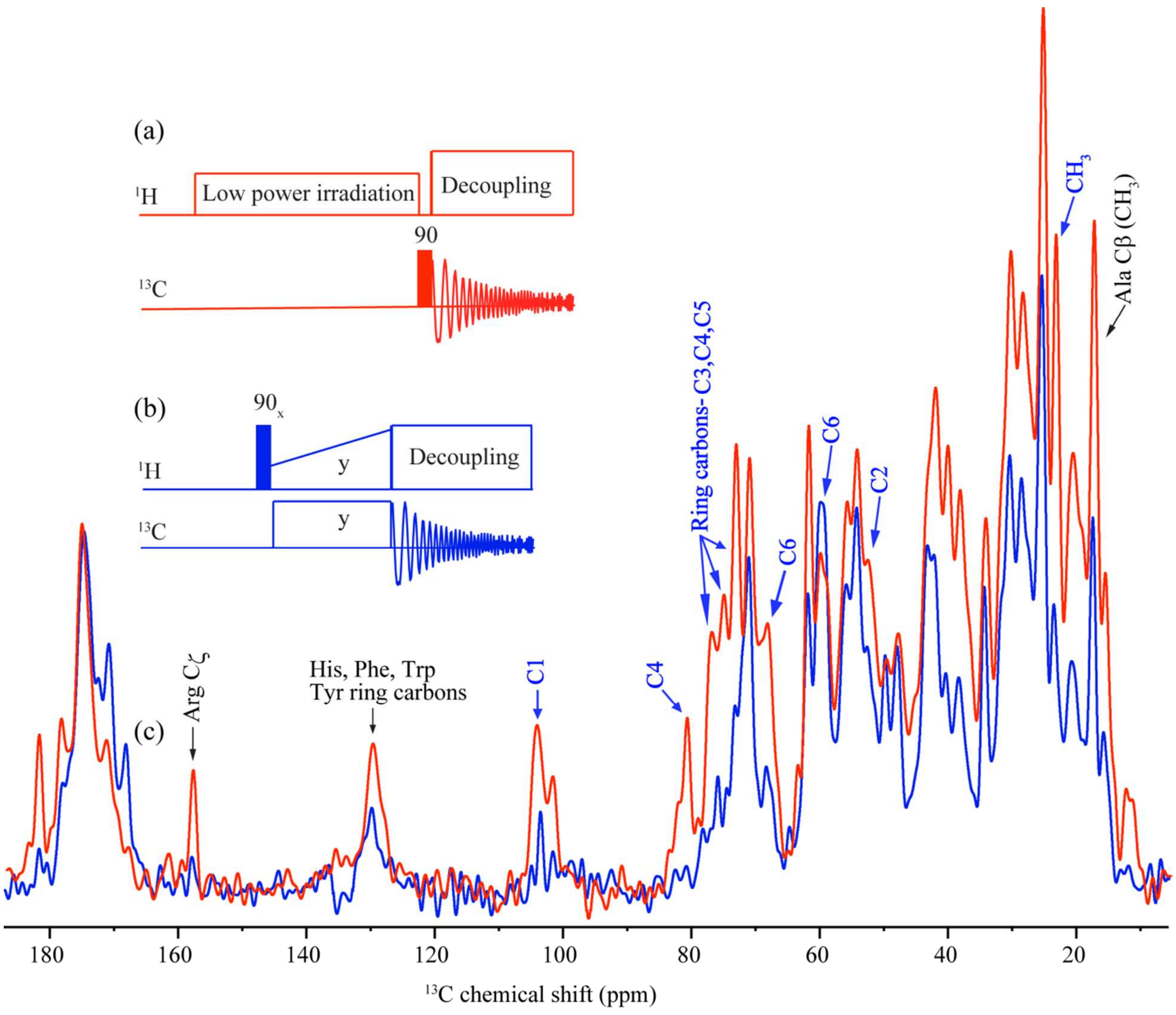
Sensitivity enhanced ^{13}C spectrum of hydrated native cartilage:

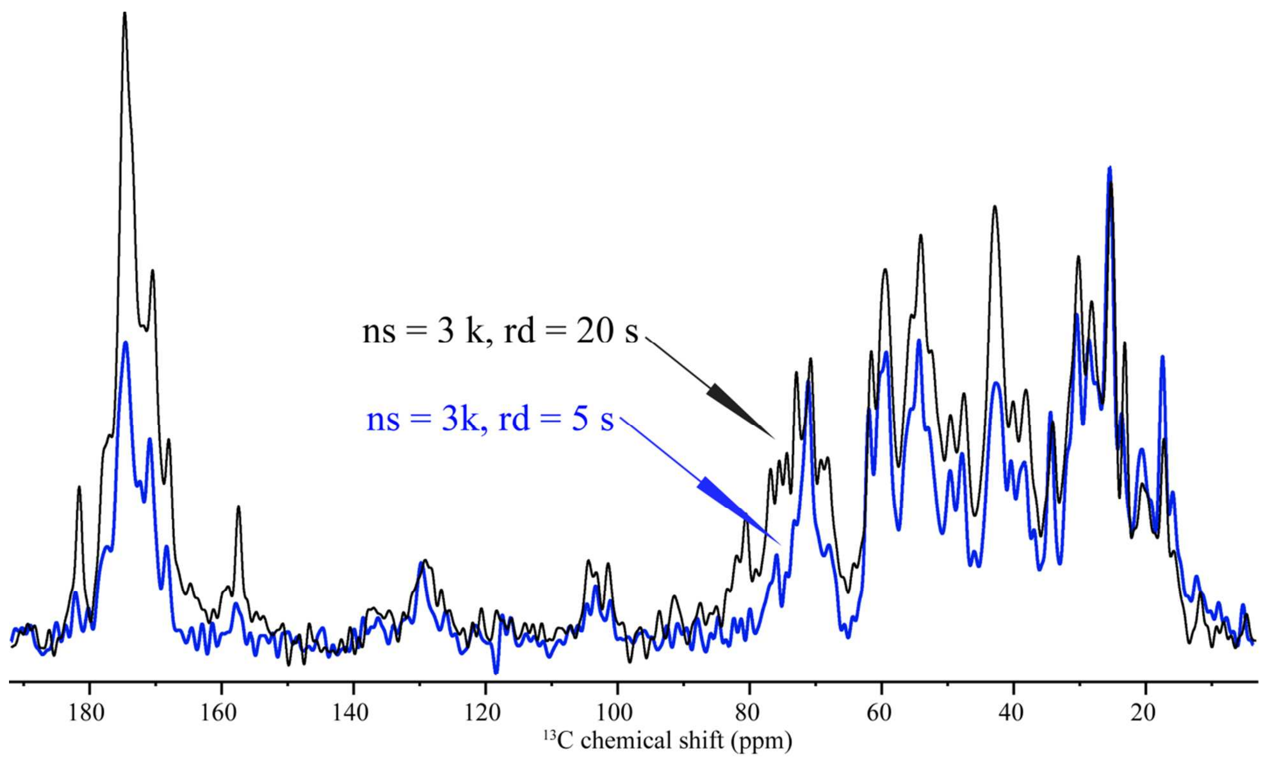
If we compare the ^{13}C spectra recorded with equal number of scans and same relaxation delay, we get more drastic results in sensitivity enhancement as shown in **SI Figure 1**.



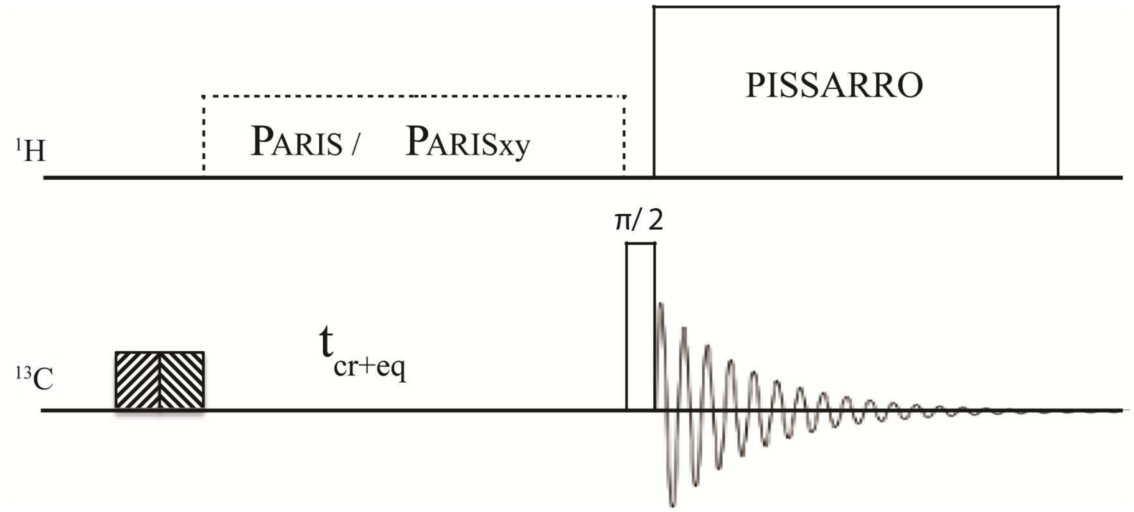
SI Figure 1. The comparison of heteronuclear Overhauser enhancement along with equilibration of magnetization by low power irradiation **(SI Figure 1(a)** red colour) and the ^{13}C spectra recorded by CPMAS (**SI Figure 1(b)**blue colour) was recorded in equal time (~ 6 hours each), 5 s RD, with 4300 and 3072 scans respectively (**SI Figure 1(c))**

^{13}C spectrum of hydrated native cartilage recorded with one pulse is time consuming:

^{13}C CPMAS is preferred over ^{13}C one pulse experiment as it provides similar sensitivity in 4-5 times lesser time as shown in **SI Figure 2.**



SI Figure 2. The spectra recorded with one pulse sequence (black color) **SI Figure 2** and CPMAS (blue color) **Figure 3** are shown here. Equal numbers of scans (3072) are recorded for each spectrum. Relaxation delay of 20 s and 5 s are used to record these spectra



SI Figure 3: The Overhauser enhancements along with equilibration of magnetization by low power irradiation method pulse sequence, used in this study to enhance sensitivity of ^{13}C resonances.

References:

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3 Chow, W. Y.; Rajan, R.; Muller, K. H.; Reid, D. G.; Skepper, J. N.; Wong, W. C.;Brooks, R. A.;Green, M.; Bihan, D.; Farndale, R. W.; Slatter, D. A.; Shanahan, C. M.; Duer, M. J. NMR Spectroscopy of Native and in Vitro Tissues Implicates PolyADP Ribose in Biomineralization. *Science* **2014**, *344*, 742-746.