\textbf{13}\textsuperscript{C}/\textsuperscript{14}N HMQC WITH ROTARY RESONANCE AND REDOR DIPOLAR RECOUPLING}

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\section*{Introduction}

\textsuperscript{14}N is the abundant (99.6\%) isotope of one of the most important elements in chemistry. We have recently introduced an indirect approach for \textsuperscript{14}N NMR detected through \textsuperscript{13}C using $J$ and residual \textsuperscript{13}C/\textsuperscript{14}N second-order quadrupolar-dipolar couplings under magic-angle spinning [1,2]. Such an experiment obtains high resolution \textsuperscript{14}N spectra separated by \textsuperscript{13}C chemical shift allowing for the measurement of \textsuperscript{14}N quadrupolar coupling. This report describes the use of dipolar recoupling with rotary resonance [3] and REDOR [4] for the \textsuperscript{13}C/\textsuperscript{14}N HMQC experiment. The much larger first-order \textsuperscript{13}C/\textsuperscript{14}N dipolar coupling enhances the efficiency of the HMQC coherence transfer and allows for long range correlation.

\section*{Experimental}

The \textsuperscript{13}C/\textsuperscript{14}N/\textsuperscript{1}H triple-resonance experiment was performed on a Bruker DRX-600 spectrometer at the NHMFL with a 4mm magic-angle spinning probe.

\section*{Results and Discussion}

Figure 1 shows the \textsuperscript{13}C/\textsuperscript{14}N HMQC pulse sequences and their results with natural abundant glycine each acquired in less than 10 min. The one on the left uses the REDOR sequence for HMQC coherence transfer. REDOR dipolar recoupling is broadband, but is susceptible to spinning frequency fluctuation. With the ~1 Hz MAS frequency control, the CO spectrum with a larger CSA and longer mixing time (6.4ms) shows some $t_1$-noise. The HMQC experiment using rotary resonance (right) is band-selective but it has the advantages of a longer and more stable $T_2$. As the results show, the 2D spectra have higher peak intensities and cleaner spectra without any $t_1$-noise.

\section*{Conclusions}

\textsuperscript{13}C/\textsuperscript{14}N HMQC spectra can be obtained efficiently under MAS with REDOR and rotary resonance dipolar recoupling.

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\section*{References}