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Dynamic nuclear polarization of carbonyl and methyl ^{13}C spins: ^{13}C acetate samples doped with trityl OX063 PETER NIEDBALSKI, CHRISTOPHER PARISH, LLOYD LUMATA, University of Texas at Dallas — Dynamic nuclear polarization (DNP) is a physics technique that amplifies magnetic resonance signals by several thousand-fold for NMR spectroscopy and imaging (MRI). Herein we have investigated the effect of carbon-13 isotopic location on the DNP of acetate (one of the biomolecules commonly used for metabolic imaging) at 3.35 T and 1.4 K using a narrow ESR linewidth free radical trityl OX063. We have found that the carbonyl ^{13}C spins yielded about twice the polarization produced in methyl ^{13}C spins. Deuteration of the methyl group, though beneficial in the liquid-state, did not produce an improvement in the polarization level at cryogenic conditions. Concurrently, the solid-state nuclear relaxation of these samples correlate with the polarization levels achieved. These results suggest that the location of the ^{13}C isotopic labeling in acetate has a direct impact on the solid-state polarization achieved and that polarization efficiency is mainly governed by the nuclear relaxation leakage factor.

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