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Transition Metal Doping Reveals Link between Electron T_1 Reduction and ^{13}C Dynamic Nuclear Polarization Efficiency[1] PETER NIEDBALSKI, CHRISTOPHER PARISH, QING WANG, The University of Texas at Dallas, ZAHRA HAYATI, LIKAI SONG, National High Magnetic Field Laboratory, ANDRE MARTINS, A. DEAN SHERRY, UT Southwestern Medical Center, LLOYD LUMATA, The University of Texas at Dallas — Since its invention in 2003, dissolution dynamic nuclear polarization (DNP) has been widely used to increase the weak signal strength of nuclear magnetic resonance (NMR). In this method, polarization is transferred from free electrons to nuclei using microwave irradiation at intermediate magnetic field and cryogenic temperatures and then rapidly dissolved using a superheated solvent. This process requires a source of free radicals, one of the most common being trityl OX063. At low field (3.35 T), polarization using trityl as the polarizing agent can be significantly enhanced by the addition of paramagnetic agents. In order to come to a greater understanding of this process, paramagnetic transition metal ion complexes were used as dopants for ^{13}C DNP using trityl. Mn^{2+}-NOTA proved to be beneficial to polarization, while Co^{2+}-NOTA and Cu^{2+}-NOTA had no impact. Electron paramagnetic resonance studies showed that the T_1 of trityl was shortened drastically by the manganese additive but remained unchanged with the addition of copper or cobalt. These results confirm the commonly assumed link between electronic T_1 and DNP efficiency.

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Peter Niedbalski
The University of Texas at Dallas

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