Hyperfine fields in Thin Pd Films by Beta-detected NMR

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Using low energy beta-detected nuclear magnetic resonance (β-NMR), the Knight shift and spin-lattice relaxation rate of dilute $^8Li^+$ implanted into a 28 nm Pd film on a MgO substrate were studied as a function of temperature. The demagnetization-corrected Knight shifts are comparable in magnitude to that in a 100 nm Pd film [1]; however, *the shift is opposite in sign*. The corresponding spin-lattice relaxation rates are linear with temperature T, but roughly 50% slower than the rates measured in Pd foil. Additionally, the shift scales with the bulk susceptibility of Pd over a much larger T range. These results suggest that both the shifts and T_1^{-1} are strongly dependent on film thickness, but the substrate and film microstructure may also play a role.

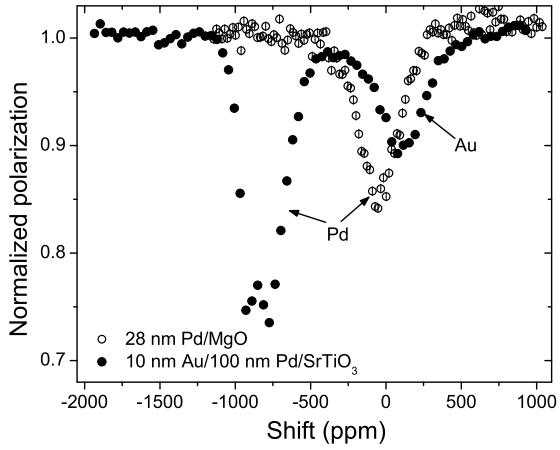

Fig. 1: Resonance spectra in two Pd films with different thicknesses and substrates. The spectrum in the thicker film is similar to bulk Pd foil.

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