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ESR induced anomalous polarization in Magnetic Resonance Force Microscopy LEI CHEN, ERIC MOORE, JONILYN LONGENECKER, JOHN MAROHN, Cornell University — Mechanically detecting electron spin resonance has opened up new avenues of performing magnetic resonance detection and imaging to an individual spin-labeled macromolecule. The large gradient field from the magnetic tipped cantilever creates selective resonance conditions for each spin label in the macromolecule. The detection is made through the shifts in the cantilever self-oscillating frequency due to the back action on to the cantilever from the resonating spin polarization. In order to improving the detection sensitivity, great efforts have been made to transfer polarization of electron spins to nearby nuclear spins. Here, we reported an anomalous frequency shift in our mechanically detected ESR experiment. This ESR induced anomalous frequency shift, however is larger in amplitude and slower in relaxation time than ESR frequency shift. We will discuss that this anomalous polarization are potentially due to the dynamic nuclear polarization (DNP) mechanism.

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