

Potential of Dynamic Nuclear Polarization in Solid-State NMR

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Solid-state NMR can analyze samples in a wide variety of states (crystalline/amorphous solids, proteins in lipid bilayers, etc.) and thus is widely used for samples ranging from inorganic/organic materials to biological molecules. However, it is not yet used to its full potential due to the inherently low sensitivity of NMR. Sensitivity enhancement, therefore, is always a central concern in NMR spectroscopy. Dynamic nuclear polarization (DNP) significantly enhances the sensitivity of NMR through the polarization transfer from electron spins to nuclear spins. Recently, this technique has emerged as a powerful tool in solid-state NMR thanks to the development of high-power, high-frequency microwave sources, low temperature magic angle spinning (MAS) probes, efficient polarizing agents, etc.

In this talk, recent applications of solid-state NMR enhanced by DNP under MAS conditions (MAS-DNP) will be reviewed. They include optimization of an absolute sensitivity ratio¹, rapid natural-abundance ¹³C–¹³C correlation experiments^{2,3}, and applications to bacterial cells⁴ and mesoporous alumina⁵ as well as the work done by other groups. The collaboration work on MAS-DNP between JEOL RESONANCE and Osaka University will also be briefly presented.

- References:**
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