NEWS | JULY 23 2018

Strides in resolution and sensitivity bring solid-state NMR technology closer to mainstream use FREE

Adam Liebendorfer

Scilight 2018, 300002 (2018)
https://doi.org/10.1063/1.5047423

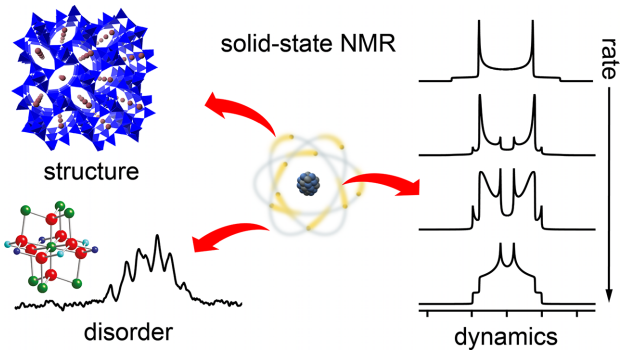
Scilight

23 July 2018

Strides in resolution and sensitivity bring solid-state NMR technology closer to mainstream use

Adam Liebendorfer

New techniques, including combining solid-state NMR with computational methods and dynamic nuclear polarization, look to boost their ability to determine new material structure information.



While solution-state nuclear magnetic resonance (NMR) spectroscopy has enjoyed widespread use in many fields of chemistry and physics, interest in using solid-state NMR still lags behind; this is despite its potential for providing researchers with vital structural information.

The research community has made progress in improving solid-state NMR's resolution and sensitivity, so much so that the technique can now provide several advantages for materials researchers. A new Perspective article published in *The Journal of Chemical Physics* showcases how advancements in solid-state NMR spectroscopy pose to elevate this lesser used technique to mainstream use.

In a solid-state system, the sensitivity to local structural environments offered by NMR parameters can help refine the average structural picture produced by classical diffraction approaches. Efforts to improve the resolution side of solid-state NMR have yielded new hardware with more effective decoupling sequences. They also feature faster spinning rates for samples at the magic angle, at which anisotropic components of the tensor of NMR interactions are averaged to zero.

Growing areas of research include those combining NMR experiments with computational methods, and the development of dynamic nuclear polarization (DNP) methods to significantly increase NMR sensitivity by transferring magnetization from electrons introduced as free radicals. DNP methods remain difficult to use because of the cost of generating high-power microwaves. But the need for a dense ^{1}H network to promote the required spin diffusion and overcome other hurdles, as well as the potentially significant gains in sensitivity, continue to drive progress.

The authors next look to continue their work using computation and solid-state NMR to study a wider variety of solid-state materials.

Source: "Perspective: Current advances in solid-state NMR spectroscopy," by Sharon E. Ashbrook and Paul Hodgkinson, *The Journal of Chemical Physics* (2018). The article can be accessed at https://doi.org/10.1063/1.5038547.