

Improvements in solid state NMR for materials characterization

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In the field of materials chemistry, the local structure of compounds can be probed efficiently by solid state NMR spectroscopy.

Recently, spectacular improvements in resolution have been achieved for quadrupolar nuclei [1] and for ¹H [2-3] thanks to new sophisticated methods associated to new equipments such as high magnetic field, ultra fast MAS probe (up to 67 kHz)...

Here, the aim of this presentation is to illustrate solid state NMR experiments carried out with the newly installed 700 MHz spectrometer and applied to the characterization of different kind of materials. This new magnet installed at the College de France in Paris is equipped in particular with two triple resonance (low gamma and high gamma) tri- $\gamma^{\text{®}}$ Bruker probes (\varnothing 3.2 mm) and an ultra-fast MAS probe (\varnothing 1.3 mm). The ultra-fast MAS probe has the advantage of combining high spinning speeds, high radiofrequency powers, and small sample volumes.

The experiments shown include ¹⁷O, ²⁷Al MQMAS (multiple-quantum magic angle spinning) experiments , ultra-high resolution ¹H solid state NMR and heteronuclear dipolar correlation ¹H-¹⁵N-¹³C CPMAS (cross polarization magic angle spinning).

[1] Ashbrook S. E., *Phys. Chem. Chem. Phys.* 2009, **Vol. 11**, 6892-6905.

[2] Mafra L., Coelho C. *et al.*, *J. Magn. Res.* 2009, **Vol. 197**, 20-27.

[3] Lesage A., *Phys. Chem. Chem. Phys.* 2009, **Vol. 11**, 6876-6891.