

(SS-NMR) Solid State Nuclear Magnetic Resonance Spectroscopy

Principle

Solid State NMR is a technique capable of providing information about structure and dynamics of molecules. It provides a structural characterization of polymers, inorganics, inorganic-organic composite materials, etc.. Although the principle is common to the NMR in solution, the equipment requires specific accessories that allow it to obtain high-resolved spectra. The most important difference from liquid-NMR is the capability of investigating conformations, crystalline phases, molecular packing and intermolecular interactions.

Time Domain NMR (Low Res). It is an alternative to classical NMR and is performed on a benchtop low-field instrument operating in time-domain only. From relaxation curves information regarding $^1\text{H}/^{19}\text{F}$ content, rigid/soft phase content, water content can be obtained. Advanced investigations can also be performed, e.g. analysis of crosslinking, degree of polymerization and domain sizes in polymer-based materials.

Capabilities

SS-NMR. Analyses can be performed on powders, soft rubbers and films. Depending on the sample constituents, suitable experiments are performed.

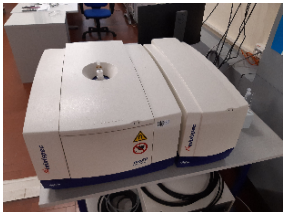
For example, the chemical structure of a common polymer is obtained with a multinuclear approach ($^1\text{H}/^{19}\text{F}/^{13}\text{C}$), but more complex experiments or variable temperature measurements can also be run for assessing further structural information.

- T range: $-40^\circ \leftrightarrow 100^\circ\text{C}$
- Most common investigated nuclei: ^1H , ^{19}F , ^{13}C , ^{29}Si , ^{31}P , ^{27}Al , ^7Li

TD-NMR. Analyses can be performed on liquid, solid or heterogeneous samples. The only limitation is that the sample can be inserted in a 10 mm glass tube. Quantitative investigations require a prior calibration with reference samples. Depending on customer needs, suitable experiments can be developed.

- T range: $-80^\circ \leftrightarrow 100^\circ\text{C}$
- Nuclei: ^1H , ^{19}F

Assets

	Asset	Details
	Agilent Direct Drive 2 400 MHz NB spectrometer	• 1.6 mm T3 MAS Special HFX probe (max spinning speed: 35 kHz, 3 channels probe: ^1H-$^{19}\text{F}/\text{X}$ (from 40 to 161 MHz)/$^{\text{Y}}$ (from 61 to 100 MHz). • 4 mm T3 MAS HX probe (max spinning speed: 18kHz, 2 channels probe ^1H or $^{19}\text{F}/\text{X}$ (from 40 to 161 MHz)
	Bruker Minispec mq20 (20MHz, 0.5T)	• ^1H 10 mm probe • ^{19}F 10 mm probe