Over 1200G/cm for polymer and multinuclear experiments

Strong field gradient probe for diffusion measurements

< Features >

- Field gradients over 1200G/cm (in use of a 30A power source).
- Tunable and autotune-compliant for major nuclear species.
- Easy sample change and good usability similar to a standard tunable probe.

< Specifications >

- Observation nuclei: ^{1}H,^{19}F, ^{7}Li, ^{11}B-^{17}O,^{15}N
- Maximum field gradients: 1200G/cm
- Sample tube out-diameter: 5mm
- Temperature range: -70 to 120℃

In NMR spectroscopy, a diffusion coefficient is determined by fitting or calculation for the following decay curve of signal intensity I(G):

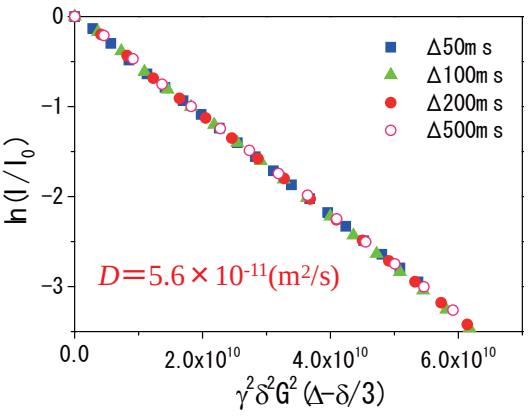
$$\frac{I(G)}{I(0)} = \exp\left[-(\gamma G\delta)^2 D\left(\Delta - \frac{\delta}{3}\right)\right]$$

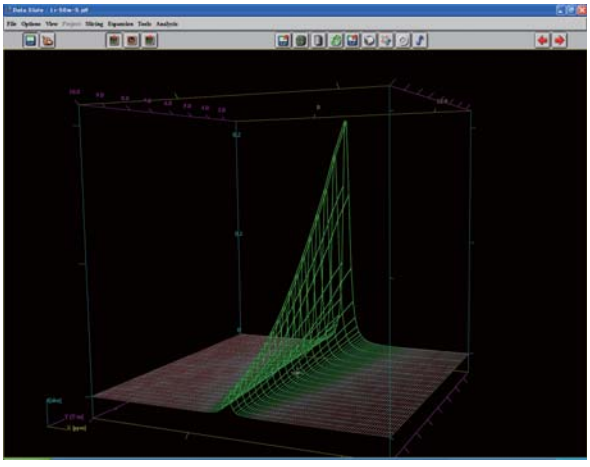
γ: Gyromagnetic ratio / G: Field gradient strength / δ: Field gradient pulse width / Δ: Diffusion time / D: Self diffusion coefficient

A maximum value of Δ is limited by the relaxation time of a sample, while δ is usually the order of ms regardless of NMR systems. Consequently, strong field gradients are required in the case of small diffusion coefficients (e.g. for polymers) and in the case of not so high-γ nuclei as ^{1}H (e.g. ^{7}Li).

< Example >

Measurements of a ^{7}Li diffusion coefficient in a solid electrolyte of lithium ion batteries.





Data are by courtesy of Dr. Y. Hashimoto, Dr. N. Horiike, H. Ayamegawa of Asahi Kasei Corporation.

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