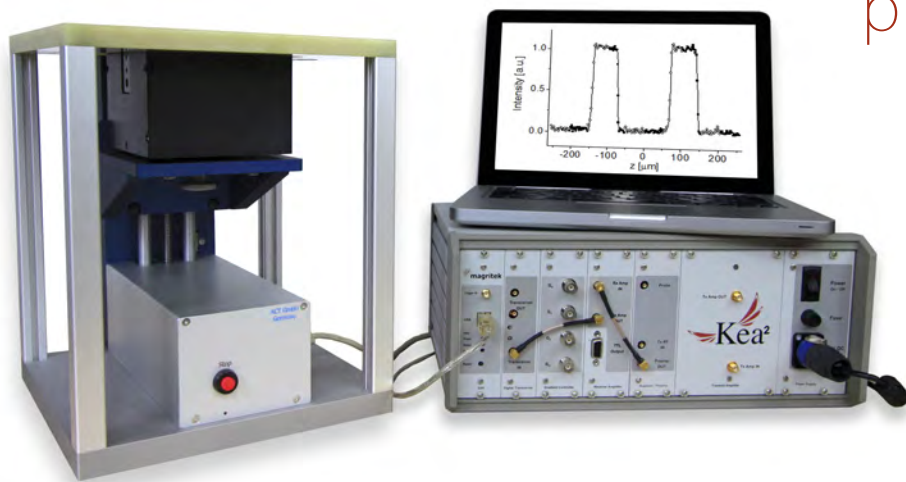


profile NMR-MOUSE

Profiling large samples
with microscopic resolution



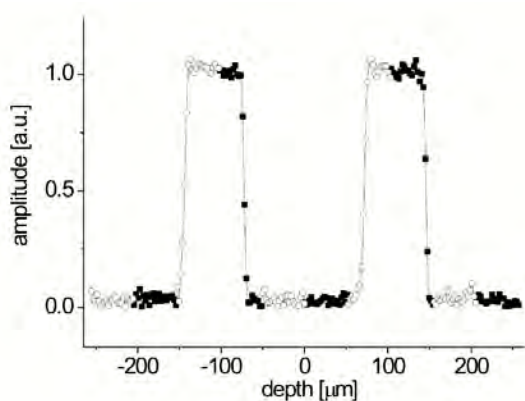
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The Profile NMR-MOUSE is a portable open NMR sensor equipped with a novel permanent magnet geometry that generates a highly uniform gradient perpendicular to the scanner surface. Given this field profile, a flat sensitive volume is excited and detected by a surface rf coil placed on top of the magnet at a position that defines the maximum penetration depth into the sample. By repositioning the sensitive slice across the object, this scanner produces one-dimensional profiles of the sample structure with a spatial resolution better than 5 μm . The gradient of the sensor can as well be utilized to measure molecular self-diffusion coefficients. By applying spin or stimulated echo sequences liquids with a wide range of viscosities can be fast and accurately measured. The Profile NMR-MOUSE system includes a high precision lift and a fully digital mobile spectrometer Kea.

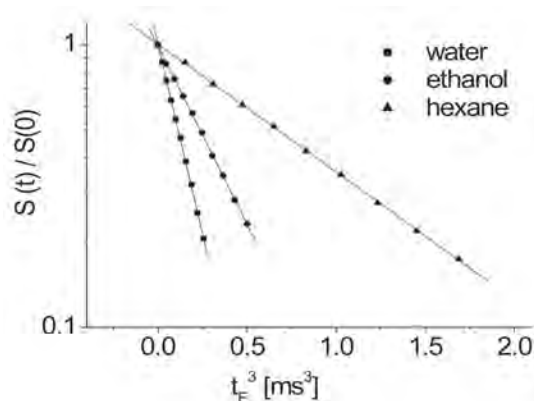
- Micrometer resolution
- Open access
- Portable
- High performance spectrometer
- Fully automated
- Small footprint

Available models of the Profile NMR-MOUSE

Model	Max. Depth (mm)	Resolution (μm)
PM 2	2	5
PM 5	5	10
PM 10	10	30
PM 25	25	100



High resolution profiles through an oil-glass multi-layer structure.



Spin echo self diffusion measurements for different liquids.

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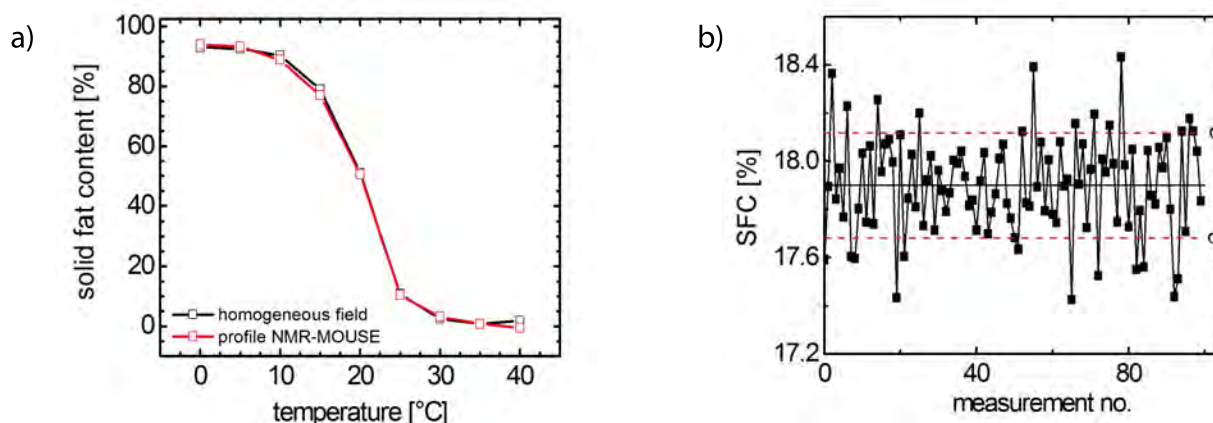
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SOLID FAT CONTENT

Low field NMR has become the standard method to determine the solid fat content of fat products. The standard method uses closed magnet sensor geometries, where the sample is filled into a sample tube and placed inside the bore of the magnet. The Profile NMR-MOUSE offers the possibility to measure the solid fat content on arbitrarily sized samples using the indirect SFC method based on ISO 8292-2. The sample is simply placed on top of the sensor and can be measured through the wall of the packaging. The measurement depth can be varied, so that the homogeneity of the SFC across a sample can be monitored. Figure a) shows a comparison of a SFC curve measured with a homogenous field magnet and the Profile NMR-MOUSE. It can be seen that the 2 curves are in excellent agreement. Figure b) shows the SFC value of one sample measured over 100 experiments. Each experiment consists of 2 scans with a repetition time of 2 seconds. The achieved standard deviation is 0.21 %.



a) SFC curve of coconut oil measured with a conventional closed magnet and the profile NMR-MOUSE. The two curves are in excellent agreement. b) SFC of a fat sample measured over 100 experiments. The standard deviation is 0.21 % for a measurement time of 4 seconds.

DROPLET SIZING

Desktop NMR spectrometers are routinely used to determine droplet size distributions in emulsions. Commercial systems available for this application require to fit few cubic centimeters of sample into an NMR tube for the analysis. In contrast, the same measurement can be performed with the NMR-MOUSE on final products in their original package in only a few minutes. Figure a) shows the echo signal decay measured for commercial dressings by implementing a stimulated echo sequence on the uniform static gradient of the sensor. Figure b) compares the results with measurements done with a standard desktop system. The good agreement proves the potential of open sensors for quality control of food products.

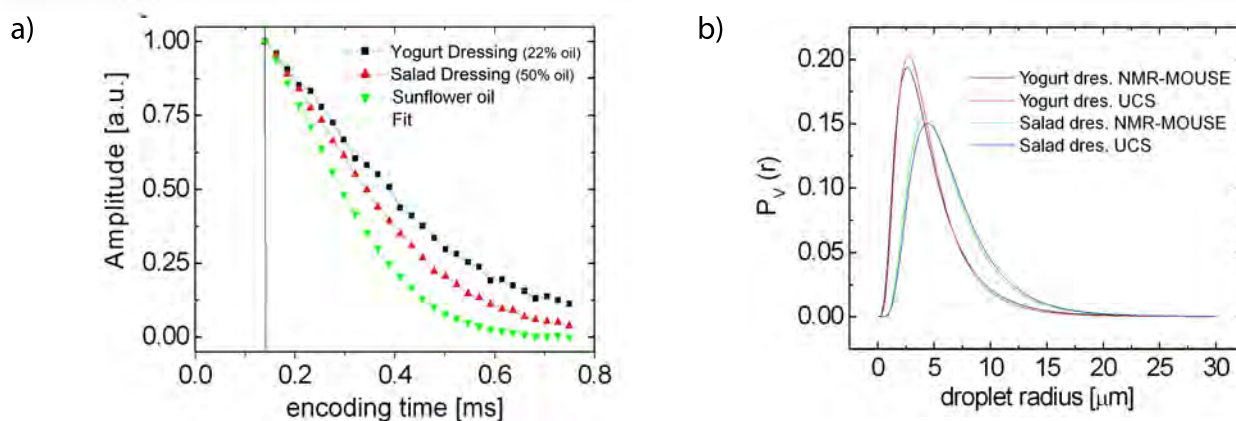


Figure a) Diffusion curves for bulk oil, yogurt dressing and salad dressing. The data were acquired using 32 steps with $\Delta=250$ ms. 16 scans were averaged per point with a recycle delay of 1 s resulting in a total experimental time of 8 minutes. b) Comparison of droplet size distributions obtained with a homogeneous field magnet and the NMR-MOUSE. It is shown that the distributions are in excellent agreement.