





Protasis/MRM

A New Dimension in NMR

NMR analysis has entered a new size regime of operation that promises to yield even greater amounts of information from smaller quantities of sample and solvent, at significantly lower cost. The marriage of newly-released and highly-advanced capillary-scale sample management platforms, particularly *capillary liquid chromatography*, and *capillary-scale NMR detection flowprobes* by MRM Corporation provides optimal mass sensitivity without compromising fluidic integrity. The gains in S/N achieved using this hyphenated approach represent an essential value to the user, who can decide, based on specific application demands, how to best spend their increased sensitivity budget: use less sample, use a shorter acquisition time, or take advantage of a compromise strategy.



We believe that the most important issue to our customer is their sample.

The application of NMR detection to new capillaryscale techniques, particularly on-line techniques such as capillary liquid chromatography, requires a careful matching of all the components in the system to take full advantage of the many benefits available from such combinations. Analogous to the electrical impedance match and transmission line quality required to maintain optimal signal integrity within system components in radio frequency circuits, so also the volumetric capacities, resistive pressures, and quality of the transport lines in fluidic circuits must be carefully balanced and engineered to maintain sample integrity throughout the entire analysis.

Introducing the MRM µFlowProbe[™] - the world's first <u>true capillary</u> NMR flow probe!

MRM's capillary µFlowProbes constitute a 100% fused silica capillary solution to NMR analysis. All wetted surfaces of the probe are fused silica, thereby maximizing solvent compatibility. Solvent consumption is drastically reduced over conventional-scale systems, making the use of NMR-compatible (deuterated) solvents cost effective and practical. MRM probes are engineered, manufactured, and calibrated to extremely high standards, so that sample management is reliable and accurate. MRM probes are easy to use, reliable to operate, and adaptable to all major NMR spectrometer systems.

MRM Probes and Waters Capillary Liquid Chromatography – a "masswinning" combination!

Sample management is one of the most critical aspects of NMR analysis. Proper preparation of the sample enables a maximum amount of information to be extracted in minimum time, and accurate control of the experiment ensures data integrity, experimental reproducibility, and offers the option of subsequent (e.g. mass spectrometry) on-line analysis. The enhanced mass sensitivity, chromatographic resolution, and concentrating ability of capillary liquid chromatography enables the application scientist to take full advantage of the enhanced NMR mass sensitivity of MRM's Microcoil probes. MRM chose to strategically align with Waters Corporation because we believe the quality of the Waters $\text{CapLC}^{(\ensuremath{\mathbb{R}})}$ surpasses that of any other capillary LC. We understand that the mutual success of the LC-NMR combination depends upon both components performing to high standards. Our alliance provides a strong platform of instrument and application support for our customers. MRM and Waters are committed as partners to stay at the forefront of the capillary revolution.







MRM's µFlowProbe™ Engineered for Unparalleled Performance

MRM's µFlowProbe[™] utilizes a unique, patented NMR detection module that provides excellent spectral resolution while maintaining high fill factor, designed to ensure that the majority of the active region of the RF coil is filled with sample. This provides the highest mass sensitivity of any commercial flow probe. Uniquely size-matched to the elution volumes of the Waters CapLC, the MRM uFLowProbe[™] has an active volume of just 1 ul.

Performance benefits:

- Low solvent consumption (mLs per day) for economical operation and minimal waste
- Full solvent gradient capability including step gradients
- Solvent Conditioning (protonated-to-deuterated, on-column solvent exchange)
- High mass sensitivity without compromising chromatographic integrity
- High solvent compatibility due to a totally fused silica capillary design.
- Excellent chromatographic and NMR spectral resolution
- Solvent management (sparge, blanket, degas) available from MRM
- Fully compatible with Varian, Bruker, and JEOL spectrometer systems
- Flow-through probe design virtually eliminates sample carryover

"Park" for free!

One of the most noteworthy features of capillaryscale fluidics is the ability to transport microliter volume samples over distances of 5-10 meters with virtually no degradation in analyte peak volume. Equally significant, the effects of diffusion and mixing at the capillary scale are very limited so that peaks can literally be parked overnight for resumption of the chromatographic run the following day, with negligible loss of S/N. These two traits, unique to capillaryscale fluidics, are of critical importance to NMR. Safe access to high-field magnets is readily facilitated by remote positioning of the sample management hardware, and the ability to park peaks in the NMR flowcell without degradation to subsequent peaks represents a major benefit, particularly when analyzing low mass samples using multi-dimensional techniques. In this manner, the application is enabled without compromise to sample integrity.

Improve your LC-NMR performance!

The combination of the Waters CapLC and the MRM µFlowProbe allows complex mixtures of small sample mass to be characterized completely, making this technique ideal for applications such as drug discovery, combinatorial chemistry, natural product identification, metabolic studies, and trace contaminant analysis. The use of steep solvent gradients is completely compatible with equilibration times (of both composition and magnetic homogeneity) typically less than 20 minutes. Furthermore, the integrated design of the Waters CapLC allows most separations to be readily downscaled from conventional methods, with minimal adjustments. And since all wetted surfaces in the system are stainless steel or fused silica, all solvents commonly used in chromatography today are compatible - even long term use of DMSO!

MRM's µFlowProbe will work with your NMR!

MRM probes are compatible with Bruker, Varian and JEOL NMR spectrometers. Currently offered are proton detect/deuterium lock probes designed for 300 MHz – 600 MHz operation. Typical lead time is less than 90 days from the time the order is placed. Installation support is provided at nominal cost, and MRM staff work closely with Waters field engineers for

installation of the CapLC-uNMR hypenate^d system.



Protasis Corporation Systems and Components for "Integrated Process Analytics"

MRM is a wholly owned subsidiary of Protasis Corporation. Protasis is a leader in designing systems and components for microflow separation technologies such an cLC, Capillary Electrophoresis and other technologies for integrated process analytics. Protasis is headquartered in Marlboro, MA.

Pricing and Ordering Information

Introductory ENC 2001 Price Solvent Conditioning Module for Waters CapLC System Installation - Probe only (US) Installation- Probe with CapLC (US) Installation (Foreign) \$29,900 \$5,900 \$3,500 \$5,000 Special Quote

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Magnetic Resonance Microsensors

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