

From Raw Materials to End Products: Low-field NMR relaxation - a Versatile Tool for R&D and Quality Control of Industrial Formulations

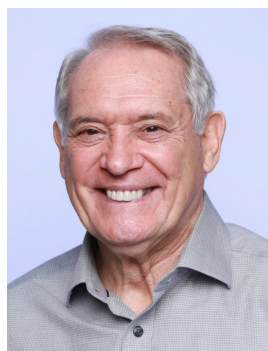
MONDAY, 2 NOVEMBER 2026

12:20 - 13:00

Room B (Ocean Hall)

40-minute seminar

Please bring your lunch box to the venue and enjoy lunch during the seminar.



SPEAKER

Dr. David Fairhurst

Founding member, Mageleka, Inc. United States

Over 60 years' experience (academic, industrial, biomedical, government and private enterprise) applying colloid and interface chemistry to formulation and product development.

SEMINAR OVERVIEW

Low-field (LF) NMR relaxation measurements probe the strength and nature of interactions at the molecular level between liquids and functional groups on particle surfaces. The technique is fast and non-invasive and can characterize suspensions/slurries under conditions that closely reflect their manufacture and use; it is sensitive to practically important differences that conventional techniques may miss.

Examples from coatings, cosmetics, batteries, pharmaceuticals and construction materials demonstrate the use in measuring powder wettability, screening dispersants, distinguishing raw-material sources, monitoring adsorption and sedimentation, assessing polymer-solvent affinity, and tracking processes such as crystallization and cement hydration. LF-NMR relaxation measurements can support formulation development, process understanding, material selection, troubleshooting and faster quality-control decision making.

ALSO PRESENTING IN THE TECHNICAL SESSION

Thu. 5 Nov. 2026

11:10 - 11:25 JST

Room D (Ocean Hall)

4D04

Session 5: Dispersion and Aggregation

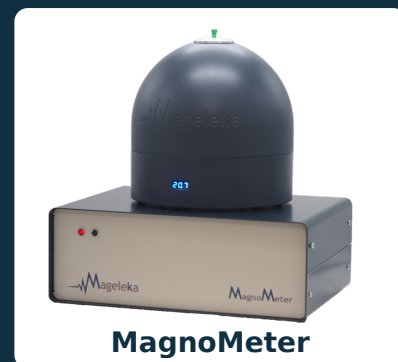
Low-field (LF) NMR Solvent Relaxation as a convenient tool to determine the Hansen Solubility Parameters (HSP) of powders and the factors affecting such values

David Fairhurst¹, Ravi Sharma² | ¹Colloid Consultants Ltd. (USA), ²Mageleka Inc. (USA)

SELECTED BIOGRAPHY

- 1968: PhD in Physical Chemistry (Liverpool Polytechnic). Holds UK Chartered Chemist and Chartered Scientist qualifications.
- Author: 60+ peer-reviewed papers.
- Inventor: 10 patents. Particle characterization instrumentation (zeta potential, particle size and LF-NMR); sunscreen and cosmetic formulations; drug delivery; vaccine development.
- Entrepreneur: Brookhaven Instruments (Partner); sunSmart (Partner); Dynamic Cosmetics (Founder); Particle Sciences (co-Founder); NPR Healthcare (co-Founder); XiGo Nanotools (co-Founder); Colloid Consultants (Founder).

From Raw Materials to End Products: Low-field NMR relaxation - a Versatile Tool for R&D and Quality Control of Industrial Formulations



Dr. David Fairhurst

2 November 2026 | 12:20 - 13:00 JST | Room B (Ocean Hall)

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This presentation explores the advanced capabilities of low-field (LF) Nuclear Magnetic Resonance (NMR) relaxation and its transformative impact on industrial and pharmaceutical research and quality control. NMR relaxation, a fundamental property intrinsic to both solids and liquids, is directly measured by an NMR spectrometer, providing a unique window into material behavior at the molecular level.

Within the field of analytical science, NMR spectroscopy is recognized as a leading technique for investigating molecular structure and dynamics. While conventional NMR approaches provide essential structural insights, this seminar focuses on liquid relaxation measurements - a rapidly evolving field that elucidates the strength and nature of interactions between liquids and particle surface functional groups. Such insights are particularly pertinent to the formulation and quality evaluation of industrial and pharmaceutical products. Relaxation time, which can be measured with high precision, serves as a critical indicator of how molecular environments affect both particulate and molecular interactions. We will discuss how relaxation methodologies offer a multidimensional perspective on material properties.

A notable advantage of LF-NMR relaxation is its capacity to precisely determine uniformity and performance in formulations. Additionally, the technique allows for the assessment of morphological factors and the influence of surface chemistry on wetting and the dispersion of powders in liquids. By capturing these characteristics, LF-NMR relaxation supports the optimization of key processes such as mixing, emulsification, and stabilization, which are essential to produce high-quality products across industries including pharmaceuticals, coatings, and cosmetics.

Attendees will gain valuable insights into the versatility of low-field NMR relaxation for routine research and development and its indispensable role in stringent quality control. The method's non-destructive nature, rapid measurement capabilities, and sensitivity to subtle changes in material composition render it an invaluable tool for scientists and engineers. Case studies and practical examples will be presented to demonstrate how NMR relaxation has been effectively employed to resolve complex challenges in formulation science and to foster innovation.

Ultimately, this seminar aims to provide participants with an understanding of NMR relaxation, showcasing its potential as a tool for enhancing formulation development, improving process optimization, and ensuring product reliability. Whether you are a researcher, quality control specialist, or technical manager, the insights presented will support your efforts to fully leverage LF-NMR relaxation in advancing industrial and pharmaceutical formulations.