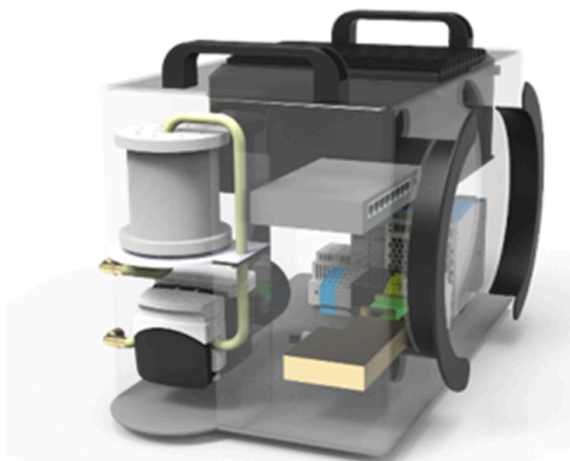




Low-Field NMR Relaxometry in Process Industries

A real-time, cost-effective NMR measurement unit for monitoring and measuring the properties of various materials.



Low-field nuclear magnetic resonance (NMR) relaxometry in materials research is based on NMR technology. The relaxation times provide information about the mobility and interactions of molecules within the material. By analyzing these relaxation times, low-field NMR can characterize the molecular dynamics of materials, including fluid mobility, polymer dynamics, and phase transitions.

State of the art

One of the key applications of low-field NMR relaxometry is the characterization of **porous materials**. By measuring relaxation times, researchers can quantify pore size distributions, surface-to-volume ratios, and fluid transport properties in porous media, such as rocks, soils, and catalysts. Low-field NMR is also used to study **moisture content and water interactions** in materials. By monitoring changes in relaxation times, researchers can assess water content, distribution, and binding mechanisms in polymers, composites, and biomaterials. Currently, NMR applications are typically designed to operate for offline-use and collecting a representative sample from the process stream is challenging.

Technology

To overcome these challenges, researchers at Xamk FiberLaboratory have developed an NMR measurement system, where the measurement unit can be installed inside the process channel and the measurement can be taken without separating the sample into separate pipelines outside the process channel.

Advantages

Strong intellectual property (IP) and numerous potential application areas, including drinking and wastewater treatment, pulp and paper, mining, and more, provide promising business prospects for this technology. The method and apparatus offer a quick and robust industrial “online” and even “inline” analytic technique for characterizing various heterogeneous materials and porous media. With continued advancements in instrumentation and data analysis techniques, it is expected that “inline” TD-NMR will make significant breakthroughs, providing substantial quality improvements and resource efficiency in process industries.

Options for companies

Xamk is looking for partners for licensing and using the technology in different application areas. Direct contract research or joint research and development cooperations are also possible. Seed funding for productization, 100-150 kEUR.

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