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Slow-MAS NMR metabolomics

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Metabolomics studies on tissues are of significance since a disease is often associated with a specific tissue or organ malfunction. It is, therefore, expected that the changes in metabolic profile is more dramatic in the diseased tissue than body fluids. It is likely that tissue specific metabolic profiling provides a unique window of investigating the biochemistry associated with a particular disease in great detail than possible using global body fluids. In this work, we will report a non-destructive magic angle spinning NMR metabolomics technique that is capable of high resolution and high sensitivity metabolic profiling on biological samples, in particular tissue samples, with sample volume from as small as 200 nanoliters (nL) to as large as a milliliter or more using a single probe and using only a few minutes. This has been achieved by combining the techniques of high resolution slow-MAS 1H NMR technique and a switchable inductively coupled static micro-RF coil-LC resonator and by rotating the specimen at a sample spinning rate of 40 to 200 Hz about the magic angle axis. The nanoliter capability has the potential to follow the metabolic changes through a continued investigation on a single small laboratory animal over a long period of time using minimally invasive blood and tissue biopsy samples. The milliliter capability would allow minimally destructive studies of intact biological object with size as large as >1 cm3. Examples of applications will be reported.

Biography

Jian Zhi Hu received his PhD in 1994 and is currently a senior staff scientist and principal investigator of Pacific Norwest National Laboratory. He has published more than 170 papers in peer reviewed journals, delivered a large number of presentations, and received two US R&D 100 awards and 10 US patents.

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