

CNDE Webinar Presentation June 12, 2025 - 10:00 a.m. CST

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Han-Held Nuclear Magnetic Resonance Spectroscopy for NDT and Mapping Defects and Their Chemical Constituents Presented by:

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Abstract:

In this presentation, I will discuss applications of nuclear magnetic resonance (NMR) imaging in detecting and identifying "chemicals" in structural defects. NMRs have been used in chemistry and as the main sensing mechanism in magnetic resonance imaging (MRI) in medicine since 1960s. For applications in non-destructive characterization of defects, smaller NMR machines have been developed. Handheld units are also being developed with rare-earth magnets at 0.5-1 T. In these smaller systems, magnetic field sensing coils are replaced with high-sensitivity magnetometers to yield large signal-to-noise ratio signals at lower NMR signal frequencies. I will discuss a micro-electro-mechanical system (MEMS) magnetometer for wearable NMR sensors and their possible applications in non-intrusive testing.

Speaker:

Massood received M.S. and Ph.D. degrees in electrical engineering from the Rensselaer Polytechnic Institute in 1984 and 1986, respectively. In 1987 he joined the faculty of EECS department at Case Western Reserve University. He was a fellow at NASA during 1992, on Sabbatical at Harvard University during 93-94, and at Yale University during 2000-2001. Massood is a USTAR Professor of ECE at the University of Utah, Electrical and Computer Eng. Department with adjunct appointment in Bioengineering Department. He is currently (2015-2016) on Sabbatical in UC Berkeley EECS Department. His current research interests include nanometrology (microwave-atomic force microscopy), molecular electronics, novel devices based on solid electrolytes, sensors and actuators (microfluidics), and quantum computing. His teaching interests include development of courses in the area of electronic device physics and electromagnetics with an emphasis on solving problems and the use of computer-aided instruction tools. He is author of three books, two book chapters, more than 110 journal publications, and numerous conference proceeding articles. He has introduced and chairs many international symposia in his fields of interest. Dr. Tabib-Azar is a recipient of the 1991 Lilly Foundation Fellowship, and he is a member of the New York Academy of Sciences, IEEE (Electron Devices), APS, AAPT, and Sigma Xi research societies. He has also received more than 10 certificate of appreciation and recognition for his professional activities and a best paper award from Design Automation conference in 2001 for his work on electromagnetic properties of interconnects and defects in ICs.

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