The Ampere Prize 2025 for Young Investigators

Dr. Tuo Wang has received the AMPERE prize for Young Investigator during EUROMAR 2025. The prize was given in recognition of his achievements in solid-state NMR spectroscopy in heterogeneous biomaterials.

Tuo Wang received his Ph.D. in Physical Chemistry under the supervision of Dr. Mei Hong in 2016, where he was trained in solid-state NMR spectroscopy, with applications to membrane proteins, plant primary cell walls, and amyloid fibrils. After a brief postdoctoral appointment in the research group, Tuo joined the faculty at Louisiana State University as an Assistant Professor in 2017 and was promoted to Associate Professor in 2021. The following year, he was appointed the Carl H. Brubaker Associate Professor of Chemistry at Michigan State University and, in 2025, promoted to the Carl H. Brubaker Professor.

Tuo's independent research program focuses on advancing our understanding of the structure–function relationships of complex carbohydrates in diverse organisms and heterogeneous biomaterials, primarily through solid-state NMR and DNP techniques [1]. His work began with investigations of plant lignocellulosic biomass [2,3] and has since expanded to fungal pathogens [4-11] and algal cells [12,13]—systems that are central to both biomedical and bio-renewable research—and, more recently, to explorations of wetland plants and soils [14], which are profoundly influenced by global climate change. By integrating a range of NMR methods, including ^{13}C, ^{15}N, and ^{1}H solid-state NMR, spectral editing techniques, as well as DNP [14,15], he has been able to obtain molecular-level insights into the biological and structural roles of carbohydrate polymers within their native cellular environments. His lab also developed a carbohydrate solid-state NMR database (www.ccmrd.org), which prepared us to rapidly assess carbohydrates from various heterogeneous sources.

During his presentation at EUROMAR 2025, titled "High-Resolution Analysis of Carbohydrate-Rich Heterogeneous Biomaterials: Exploring the Wild with Solid-State NMR and DNP," Dr. Wang highlighted key advances in understanding the structure of plant lignocellulose. He outlined current capabilities for characterizing both ^{13}C-labeled biomass and unlabeled samples, the latter made possible by natural-abundance DNP methods. He then posed an important question: "Can DNP tackle real-world samples?" This led to his study of native wetland soil, endangered by rapid wetland loss due to erosion, where all samples are unlabeled and exceptionally complex. Dr. Wang demonstrated that DNP enables a molecular-level view of plant decomposition into soil over millennia. He concluded his talk with a summary of recent progress in high-resolution solid-state NMR, particularly the integration of ^{1}H-detection approaches with DNP. These methods provide new insights into fungal cell wall architecture and reveal correlations between peak multiplicity, structural polymorphism, and the biological functions of cellular carbohydrates.

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