IN SITU MAGIC-ANGLE SPINNING NMR OF MEMBRANE PROTEINS: FROM VISION TO PRACTICE

Guido Pintacuda

Lyon High-Field NMR Center (CNRS/ENS Lyon/UCBL), Villeurbanne, France
guido.pintacuda@ens-lyon.fr

Membrane proteins play essential roles in biology, but their structural study is complicated by the need for simplified mimetic systems that often fail to capture the complexity of native membranes. Solid-state NMR, with its sensitivity to local environments, is uniquely suited for in situ studies in physiologically relevant contexts. Enabled by advances in isotopic labeling, high magnetic fields, fast sample rotation and proton detection, in situ Magic-Angle Spinning (MAS) NMR now allows atomic-level insights directly in native membranes. I will review recent progress in this field and highlight our study of the E. coli outer membrane protein A (OmpA) in native outer-membrane vesicles, performed up to 100 kHz MAS and 1.2 GHz fields. These experiments revealed the first high-resolution structure of OmpA in its physiological setting, establishing a general workflow for probing membrane proteins in complex environments.