Poster 212

Nuclear Magnetic Resonance Insights into Supramolecular Structuring and Motion in Biomaterials for Neuronal and Chondrogenic Regeneration

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Peptide amphiphiles spontaneously assemble near physiological conditions yielding soft biomaterials composed of supramolecular nanostructures with unique sizes, internal order and mobility that can drive regeneration by signaling cells. Monomer design and co-assembly strategies allow precise control of neuronal and chondrogenic bioactivity, with supramolecular motion playing a key role. To advance these materials, we use multinuclear and multiphase NMR spectroscopy to resolve structures from atomic to supramolecular scales. The work explores NMR studies on PA (co)polymers for spinal cord and cartilage regeneration, revealing relationships between supramolecular structuring and motion, bioactive signaling, and ion interactions. We show the power of NMR as a tool for characterizing supramolecular materials and guiding the design of next-generation bioactive nanostructures with enhanced therapeutic function.