

# Preface

This is the fourth volume in a special topic series devoted to the latest developments in protein nuclear magnetic resonance (NMR) under the Biological Magnetic Resonance series. The previous two volumes were 16 (*Modern Techniques in Protein NMR*), 17 (*Structure Computation and Dynamics in Protein NMR*), and 20 (*Protein NMR for the Millennium*). Whereas most of the past NMR methodology developments could be considered as ‘broad brushstrokes’, technical developments since have focused on obtaining detailed, real-world, and biologically/biomedically relevant results that provide information on the inner workings of biomolecular mechanism/binding/folding/aggregation. We are always interested in further pushing the limits of protein size in solution and solid state NMR methods.

Once again, we are indeed honored to have brought together in Volume 32 some of the world’s foremost experts who have provided broad leadership in advancing the protein NMR field. This special topics volume is divided over three areas: I. Assignment of protein NMR spectra II. Dynamic nuclear polarization (DNP) and specialized methods and applications and III. Solid-state NMR of macroscopically aligned membrane proteins.

The opening chapter of Volume 32 by Christina Redfield deals with Assignment of Protein NMR Spectra Using Heteronuclear NMR—A Tutorial. It is wonderful to present both a ‘toolbox’ of the methodology and examples of applications for both the novice in the field as well as the accomplished protein NMR researcher. Of course, the nuclear Overhauser effect (NOE) is a key component to structure solution and this leads us into the following three chapters that focus on DNP and proton relaxation enhancement techniques in protein NMR. Chapter 2 deals with strategies for Mapping out Protein Hydration Dynamics by Overhauser Dynamic Nuclear Polarization, by Songi Han and coworkers Chi-Yuan Cheng, Jinsuk Song, and John Franck. In Chap. 3, Andrea Sauerwein and Flemming Hansen discuss Relaxation Dispersion NMR Spectroscopy which has become a very attractive tool to study the dynamics of biological macromolecules. In Chap. 4, Solution PRE NMR, Tobias Madl and collaborators Henry Hocking and Klaus Zangger will provide the NMR spectroscopist with the essential tools for using solution proton relaxation enhancement (sPRE) outlining the basic theory, implementation processing, and interpretation of data. The last chapter is an extension of the solid-

state NMR method given to the study of membrane proteins. In Chap. 5, by Alex Smirnov and Alexa Nevzorov, the topic is Orientational and Motional Narrowing in Solid-State NMR of Membrane Proteins Macroscopically Aligned by Nanopores. This is an exciting combination of nanopore/nanostructure technology and NMR.

I am extremely proud of this compilation of excellent contributions from leading investigators describing significant advances in the biomolecular NMR field. I am also extremely grateful to Ken H. Mok, Trinity College, Dublin for his excellent input and advice during the initial stages of preparing this volume.

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