

Contents

Part I Why and How Proteins Denature Under Pressure?

1	Early Days of Pressure Denaturation Studies of Proteins.....	3
	Keizo Suzuki	
2	Protein Denaturation on p-T Axes – Thermodynamics and Analysis	19
	László Smeller	
3	Driving Forces in Pressure-Induced Protein Transitions.....	41
	Tigran V. Chalikian	
4	Why and How Does Pressure Unfold Proteins?	59
	Catherine A. Royer	

Part II Volume, Compressibility, Fluctuation and Interaction in Proteins

5	Volume and Compressibility of Proteins	75
	Kunihiko Gekko	
6	Pressure-Dependent Conformation and Fluctuation in Folded Protein Molecules	109
	Mike P. Williamson	
7	Water Turns the “Non-biological” Fluctuation of Protein into “Biological” One	129
	Fumio Hirata	
8	Pressure Effects on the Intermolecular Interaction Potential of Condensed Protein Solutions.....	151
	Roland Winter	

Part III Pressure and Functional Sub-states in Proteins

- 9 High Pressure NMR Methods for Characterizing Functional Substates of Proteins** 179
Hans Robert Kalbitzer
- 10 High-Pressure NMR Spectroscopy Reveals Functional Sub-states of Ubiquitin and Ubiquitin-Like Proteins** 199
Ryo Kitahara
- 11 Functional Sub-states by High-pressure Macromolecular Crystallography** 215
Anne-Claire Dhaussy and Eric Girard
- 12 Cavities and Excited States in Proteins** 237
Hua Li and Yuji O. Kamatari

Part IV Pressure and Protein Folding and Assembly

- 13 Exploring the Protein Folding Pathway with High-Pressure NMR: Steady-State and Kinetics Studies** 261
Julien Roche, Mariano Dellarole, Catherine A. Royer, and Christian Roumestand
- 14 Basic Equations in Statics and Kinetics of Protein Polymerization and the Mechanism of the Formation and Dissociation of Amyloid Fibrils Revealed by Pressure Perturbation** 279
Hideki Tachibana
- 15 Pressure-Inactivated Virus: A Promising Alternative for Vaccine Production** 301
Jerson L. Silva, Shana P.C. Barroso, Ygara S. Mendes, Carlos H. Dumard, Patricia S. Santos, Andre M.O. Gomes, and Andréa C. Oliveira

Part V Pressure Effects on Biological Membranes

- 16 How Do Membranes Respond to Pressure?** 321
Hitoshi Matsuki
- 17 Pressure Effects on Artificial and Cellular Membranes** 345
Roland Winter
- 18 Effects of High Hydrostatic Pressure on Microbial Cell Membranes: Structural and Functional Perspectives** 371
Fumiyoshi Abe
- 19 Homeoviscous Adaptation of Membranes in Archaea** 383
Philippe M. Oger

Part VI Pressure Adaptation and Tolerance of Proteins and Living Organisms

- 20 Pressure-Dependent Gene Activation in Yeast Cells** 407
Hitoshi Iwahashi
- 21 Environmental Adaptation of Dihydrofolate Reductase from Deep-Sea Bacteria** 423
Eiji Ohmae, Kunihiko Gekko, and Chiaki Kato
- 22 Moss Spores Can Tolerate Ultra-high Pressure** 443
Fumihisa Ono

Part VII High Pressure Food Processing and Sterilization

- 23 Pressure-Based Strategy for the Inactivation of Spores** 469
Christian A. Lenz and Rudi F. Vogel
- 24 Use of Pressure Activation in Food Quality Improvement** 539
Toru Shigematsu
- 25 Use of Pressure for Improving Storage Quality of Fresh-Cut Produce** 551
Hidemi Izumi
- 26 Application of High-Pressure Treatment to Enhancement of Functional Components in Agricultural Products and Development of Sterilized Foods** 567
Eri Ohara, Mariko Kawamura, Miyuki Ogino, Eri Hoshino, Atsushi Kobayashi, Jun Hoshino, Akira Yamazaki, and Tadayuki Nishiumi

Part VIII Pressure Effects on Motility, Physiology and Health

- 27 High-Pressure Microscopy for Studying Molecular Motors** 593
Masayoshi Nishiyama
- 28 Ion Channels Activated by Mechanical Forces in Bacterial and Eukaryotic Cells** 613
Masahiro Sokabe, Yasuyuki Sawada, and Takeshi Kobayashi
- 29 Gravitational Effects on Human Physiology** 627
Yoriko Atomi

Part IX Methodology

- 30 High Pressure Small-Angle X-Ray Scattering** 663
Tetsuro Fujisawa

31	High Pressure Macromolecular Crystallography	677
	Nobuhisa Watanabe	
32	High-Pressure Fluorescence Spectroscopy	687
	Akihiro Maeno and Kazuyuki Akasaka	
33	High Pressure NMR Spectroscopy	707
	Kazuyuki Akasaka	
	Appendix	723
	Index	727

High Pressure Bioscience

Basic Concepts, Applications and Frontiers

Akasaka, K.; Matsuki, H. (Eds.)

2015, XVII, 730 p. 264 illus., 155 illus. in color.,

Hardcover

ISBN: 978-94-017-9917-1