Measurement Techniques and Practices of Colloid and Interface Phenomena

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Editor

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Springer

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Foreword for English Translation

Colloid and surface science is related to every phenomena of materials encountering each other, but most of the case it was overlooked or ignored in daily life because handling of materials are mostly in the bulk or mass. While recent popularization of nano-technology and expectation of its utilization is remarkable and there are many people facing to measure the properties of materials at nanometer order which is rather complicated and not easy to be accustomed.

Among the scientists who have been working for more than a hundred years in the colloid and interfacial science, people always talked about nano and developed many instrumentation in this field. Professor Abe's laboratory at Tokyo University of Science is one of the largest labs fully equipped with most of the instruments required for surface chemical measurement. To keep such activity, there are depths of expertise and resources. This is the reason Professor Abe published "Measurement Techniques and Practices of Colloid and Interface Phenomena" in 2016 and assembling training course to utilize the book for the people in the industry.

This English translation is planned to spread our experience out of Japan to help people interested in the colloid and surface science. This book is not comprehensive, rather aimed to provide tips and hints to find solutions when faced to the difficulties of measurement.

The unique value of nano is not just its size. If you take a gold cube, it is mostly bulk with comparatively little surface area. But if you dice that golden cube into many smaller pieces, the mass stays the same while the amount of surface area increases greatly. That surface area is full of energy – and full of possibilities (like purple gold particles) for the scientists working in nano.

We hope this English translation find its own way to help people working on the nanotechnology and students trying to get into the surface science.

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August 2018

Kazutami Sakamoto

Preface

(This preface is translated from original Japanese publication)

This book "Measurement Techniques and Practices of Colloid and Interface Phenomena" has been prepared by scientists actively contributing for the advancement of colloid and surface science and technology who have close acquaintances with me as professor at Research Institute for Science and Technology, Tokyo University of Science. This book was planned to provide concise guidance to the young scientists entering this field on the measurement of typical physico-chemical properties relating to colloid and surface science.

This book is structured by starting introductions to the field, introduction section and followed by 19 chapters relating to measurement techniques specified to each basic properties and measurement as follows; Chapter 1: Basics of Surface Chemistry, Chapter 2: Static Surface Tension, Chapter 3: Dynamic Surface Tension, Chapter 4: Surface Pressure, Chapter 5: Surface Viscosity, Chapter 6: Interfacial Tension between Water and Oils, Chapter 7: Quartz Crystal Microbalance with Dissipation monitoring (QCM-D), Chapter 8: Atomic Force Microscope (AFM), Chapter 9: Static Light Scattering (SLS), Chapter 10: Dynamic Light Scattering (DLS), Chapter 11: Solubilization by Micelle, Chapter 12: Rheology, Chapter 13: Freeze-Fracture Transmission Electron Microscopy, Chapter 14: Cryo-Transmission Electron Microscopy, Chapter 15: Zeta(ζ)-potential for Micelle and Microemulsion, Chapter 16: Electron Microscopy Observation of Solid Particles, Chapter 17: Gas Adsorption on Surface of Solid Materials, Chapter 18: Contact Angle Measurement for Solid Surface, Chapter 19: Quality and treatment of water for experiment.

Each chapter consists of sub sections including *Introduction, What You Get, Essentials and Tips, Understanding Your Data, What to Look Out For, Useful Hints and additional sub sections for some chapters* from a beginner's view point.

Chapter 17 explains how to prepare physico-chemically pure water, especially for nanometer level measurement, to avoid biological contamination.

I hope this book fits the reader's interest and helps to support their research advancement.

Noda, Japan Masahiko Abe
April 2016

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