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Isamu Kaneda
Editor

Rheology of Biological Soft Matter

Fundamentals and Applications

Editor

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Preface

Rheology is a research field that involves learning about transformation and flow over a wide range. In the twentieth century, the main subject of rheological study was the melt or the solution of the synthetic macromolecule, and excellent results were obtained both experimentally and theoretically. Therefore, many technical books in the field have been published. Although “hard material”—steel, concrete, and kinds of plastics—were the characteristic words of material science through the twentieth century, “soft matter” became the main target of material science in the twenty-first century.

There are many “interfaces” between humans and materials in various areas. Therefore, the importance of rheology for soft material has increased. For example, the quantitative estimation of food texture is the most important issue in the food science field. In particular, special foods for the elderly have been actively developed due to the progression of aging in the population. Because elderly people lose mastication and swallowing capability, developers have to consider the rheological properties of their products seriously. Cosmetics also work in such “interfaces”. Because cosmetic products are used every day, the feeling of the products when applied strongly affects their palatability to consumers. Regenerative medicine has also been focused on in recent years. Artificial organs or tissue are in direct contact with living tissue; therefore, their rheological properties are key points for their development.

Not coincidentally, newly developed rheology equipment, which can detect quite low torque by using an air-bearing system and novel methods such as microrheology techniques, may drive such a trend. Specifically, in the fields of food, cosmetic, and personal care products, rheological properties are quite important for both consumers and the related industries. Namely, the dynamic characteristic values such as food texture or the feeling of lubrication with cosmetics are the most important as such product characteristics. In those cases, rheological parameters

can become the benchmark of the development of these products. The topics presented in this book deal not only with application aspects but also with selected fundamental research.

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