Preface

Skin is the outer layer covering human or animal body and is a complex biological structure. Its function is to protect the body from physical and environmental assaults and to provide sensation, heat regulation, water resistance, and so on. Environmental conditions, such as dry and cold weather, can reduce the moisture content of skin and increase the skin roughness and physical discomfort. Skin is damaged as it goes through daily activities. Skin also ages with time. For healthy and beautiful human skin, cleaning and maintenance of skin is a daily process. Various beauty care products involve surface interaction between the product and the skin surface they are applied to. Skin cream is used to improve the skin health and create a smooth, soft, and flexible surface with moist perception by altering the surface roughness, adhesion, friction, elasticity, and surface charge of the skin surface. Rheology of skin cream as a function of cream thickness and strain rate and the binding interaction between skin cream and skin surface and operating environment are some of the important factors affecting the smooth feel and repair of the skin surface. The vibrations generated during the rubbing are a function of friction at the interface and govern the tactile perception of skin texture by the brain.

Atomic force microscopy (AFM) and nanoindentation have recently become important tools for studying micro-/nanoscale properties in beauty care, including human hair, hair conditioner, skin, and skin cream. In this book, we present an overview of the structural, nanotribological, and nanomechanical properties of skin with and without cream treatment as a function of operating environment. Relevant mechanisms are discussed. The result of a triboelectrification study of skin with and without cream treatment is presented. Next, an overview of attempts to develop a synthetic skin for research purposes is presented. Finally, data on tactile response of skin with and without cream treatment are presented.

This is the first book on nanotribological and nanomechanical properties of skin and skin treatment. The book is written for a novice in the field. It should serve as a reference book for researchers, practitioners, and users.

The author would like to thank his former students and senior colleagues who contributed to the research reported in the book. These include Prof. Shirong Ge, Dr. Wei Tang, Dr. Si Chen, and Shuyang Ding. The author would also like to thank Renee L. Ripley for many important contributions during the preparation of the manuscript.

Powel, OH, USA Bharat Bhushan

http://www.springer.com/978-3-319-45706-2

Biophysics of Skin and Its Treatments
Structural, Nanotribological, and Nanomechanical Studies
Bhushan, B.
2017, XIV, 165 p. 77 illus., 26 illus. in color., Hardcover
ISBN: 978-3-319-45706-2