



# Physical-Chemical Mechanics of Disperse Systems and Materials (Progress in Colloid and Interface Science)

*Eugene D. Shchukin, Andrei S. Zelenev*

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Physical–Chemical Mechanics of Disperse Systems and Materials is a novel interdisciplinary area in the science of the disperse state of matter. It covers the broad spectrum of objects and systems with dimensions ranging from nanometers to millimeters and establishes a fundamental basis for controlling and tuning the properties of these systems as well as the processes taking place in them.

Physical–chemical mechanics focuses on the analysis of the complex physical–chemical interfacial phenomena taking place both in the transition of a dispersed system into a material, such as in the course of pressing, sintering, hydration hardening, and sol-gel transitions, and in the course of the dispersion of bulk materials taking place in milling, mechanical treatment, friction and wear, and fracturing. These studies are based on thorough experimental investigation of contact interactions between particles in these processes.

The book is divided into two sections. The first section covers basic principles of the formation, stability and rupture of contacts between particles in different media and in surfactant solutions, as well as the properties of coagulation structures and their rheology. The second section covers surface phenomena taking place in solid-like structures with phase contacts and in compact bodies with an emphasis on several applications and processes as well as the special role of the Reh binder effect.

Where appropriate and relevant, the book presents essays on specific significant and principal studies, such as the damageability of crystal and glass surfaces, the strength of industrial catalysts, the nano-mechanisms of cement hardening, the role of the structure-mechanical barrier in the stabilization of fluorinated systems, and contact interactions in papermaking. It also devotes attention to experimental methods used in physical–chemical mechanics, the direct measurement of contact strength, and relevant instrumentations.

The book utilizes the content used over many years in lecture courses and includes fundamental material on colloid and surface chemistry, the strength of materials, rheology, and tensors, which makes it well suited for novices and experts in the field.

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