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Wetting of Real Surfaces

Edward Yu Bormashenko, Walter de Gruyter GmbH, Berlin/Boston 2013, ISBN 978-3-11-025853-0, 170 pp.

We have experienced an explosion of research on the fabrication of surfaces and coatings with controlled wettability in the last several years, with hundreds of reports now published annually. Researchers from practically all engineering and scientific disciplines are driven to this research area. The interest in this class of surfaces/coatings is driven by an emerging market for water-repellant, snow- and ice-phobic products and formulations, water antifogging screens, windows and lenses, antifouling coatings, microfluidic devices, coatings for enhanced boiling heat transfer, foils for food packaging and many other products. The popularity of this emerging subdiscipline of surface chemistry can also be attributed to uncomplicated fabrication technologies that can produce surfaces and coatings with a designed response to a liquid environment in addition to the simplicity of the testing techniques used, such as contact angle measurements.

Publications coming from many new research labs around the world deliver interesting new ideas and concepts related to the fabrication of superhydrophobic, superhydrophilic, oleophobic, oleophilic and other surfaces with controlled wetting characteristics. Unfortunately, this is not always done with appropriate training and background in wetting phenomena. The book by Bormashenko is published at an opportune time, and it serves as an excellent source for the fundamentals of contact angles and their interpretation on solid surfaces of various finish and properties. It provides a much-needed theoretical and applied background for all newcomers to the science of liquids on solid surfaces.

The book is divided into nine well-crafted sections:

(*1*) What is surface tension?
(*2*) Wetting of ideal surfaces
(*3*) Contact angle hysteresis
(*4*) Dynamics of wetting
(*5*) Wetting of rough and chemically heterogeneous surfaces: the Wenzel and Cassie models
(*6*) Superhydrophobicity, superhydrophilicity, and the rose petal effect
(*7*) Wetting transitions on rough surfaces
(*8*) Electrowetting and wetting in the presence of external fields
(*9*) Nonstick droplets

The complex concepts of wettability are introduced in a manner that should be understandable to any level researcher, including undergraduate students. Written for both beginners and experienced researchers in the field, the book uses well-established principles and terminology from surface chemistry to introduce the reader to the static and dynamic problems in wetting and spreading. Some background in multivariable calculus is needed to go through theoretical equations presented in the book, but mathematical tools are not crucial for understanding the concepts presented.

The book could serve as a much-needed textbook to the students in any introductory course on wetting, if calculation problems and questions are added to the textbook. Ideally, solutions to these problems and questions would be offered separately to instructors.

In summary, this book will be of great interest and value to everyone interested in the contemporary research and development activity in the fascinating world of contact angles and wettability, and the fundamentals garnered in the book will serve as a fountainhead for new research ideas and applications.

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