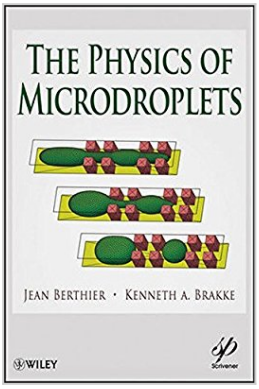

The Physics of Microdroplets

By Jean Berthier, Kenneth A. Brakke

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The Physics of Microdroplets gives the reader the theoretical and numerical tools to understand, explain, calculate, and predict the often nonintuitive observed behavior of droplets in microsystems.

Microdrops and interfaces are now a common feature in most fluidic microsystems, from biology, to biotechnology, materials science, 3D-microelectronics, optofluidics, and mechatronics. On the other hand, the behavior of droplets and interfaces in today's microsystems is complicated and involves complex 3D geometrical considerations. From a numerical standpoint, the treatment of interfaces separating different immiscible phases is difficult.

After a chapter dedicated to the general theory of wetting, this practical book successively details:

- The theory of 3D liquid interfaces
- The formulas for volume and surface of sessile and pancake droplets
- The behavior of sessile droplets
- The behavior of droplets between tapered plates and in wedges
- The behavior of droplets in microchannels
- The effect of capillarity with the analysis of capillary rise
- The onset of spontaneous capillary flow in open microfluidic systems
- The interaction between droplets, like engulfment
- The theory and application of electrowetting
- The state of the art for the approach of 3D-microelectronics using capillary alignment

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Editorial Review

From the Back Cover

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Audience

The core market is broad including biotechnologists, biologists, bioengineers, biochemists, and materials scientists. In addition, engineers and scientists involved in 3D microelectronics, optofluidics, and mechatronics, will find much value in this book.

About the Author

Jean Berthier is a Scientist at the CEA/LETI and teaches at the University of Grenoble, France. He is presently involved in the development of microdevices for liquid-liquid extraction (LLE), flow focusing devices (FFD) for bio-encapsulation of live cells, microfluidic resonators for high sensitivity biodetection and numerical methods for the prediction of droplets and interfaces behavior in microsystems. He is the first author of the book Microfluidics for Biotechnology published in 2005 with a second edition in 2010. He is also the author of the book Microdrops and Digital Microfluidics, published in 2008.

Kenneth A. Brakke is Professor of Mathematics and Computer Science at Susquehanna University in Pennsylvania. He received his PhD in mathematics from Princeton University in the field of geometric measure theory. Since 1988, he has written and maintained his freely available Surface Evolver software, which shows computer models of liquid surfaces.

Users Review

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