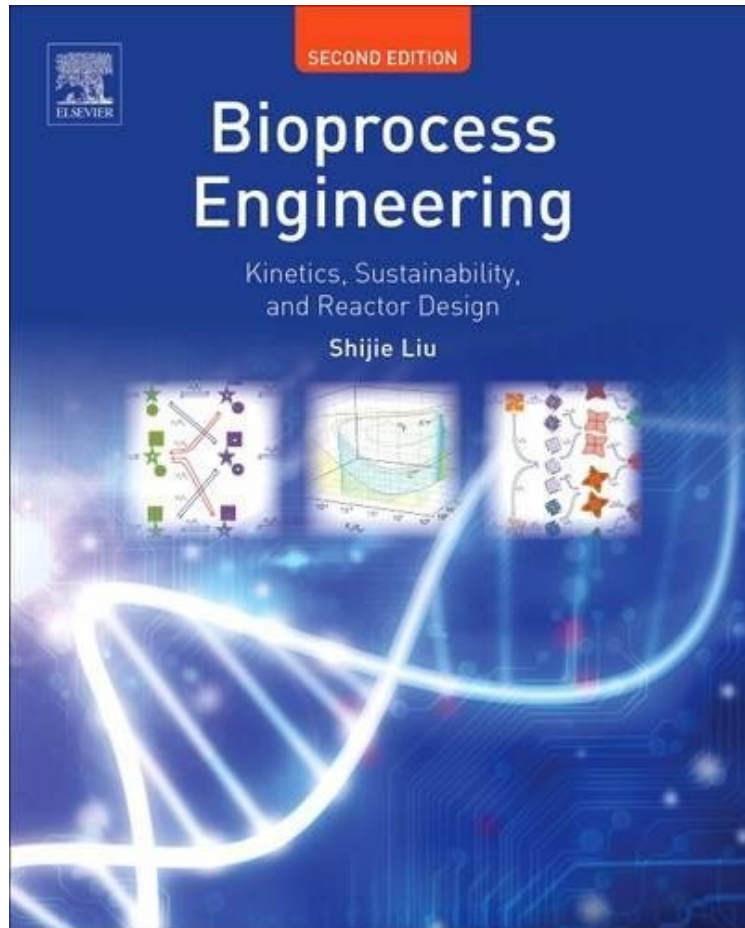


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# Bioprocess Engineering, Second Edition: Kinetics, Sustainability, and Reactor Design

Shijie Liu

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Bioprocess Engineering: Kinetics, Sustainability, and Reactor Design, Second Edition, provides a comprehensive resource on bioprocess kinetics, bioprocess systems, sustainability, and reaction engineering. Author Dr. Shijie Liu reviews the relevant fundamentals of chemical kinetics, batch and continuous reactors, biochemistry, microbiology, molecular biology, reaction engineering, and bioprocess systems engineering, also introducing key principles that enable bioprocess engineers to engage in analysis, optimization, and design with consistent control over biological and chemical transformations. The quantitative treatment of bioprocesses is the central theme in this book, with more

advanced techniques and applications being covered in depth. This updated edition reflects advances that are transforming the field, ranging from genetic sequencing, to new techniques for producing proteins from recombinant DNA, and from green chemistry, to process stability and sustainability. The book introduces techniques with broad applications, including the conversion of renewable biomass, the production of chemicals, materials, pharmaceuticals, biologics, and commodities, medical applications, such as tissue engineering and gene therapy, and solving critical environmental problems. Includes the mechanistic description of biotransformations and chemical transformations Provides quantitative descriptions of bioprocesses Contains extensive illustrative drawings, which make the understanding of the subject easy Includes bioprocess kinetics and reactor analysis Contains examples of the various process parameters, their significance, and their specific practical use Incorporates sustainability concepts into the various bioprocesses

**About the Author** Dr. Shijie Liu is a professor of bioprocess engineering at the State University of New York - College of Environmental Science and Forestry (SUNY ESF), Syracuse, NY, USA. His contributions include volume averaging in porous media, kinetics of reactions on solid surfaces, cooperative adsorption theory, the theory of interactive enzymes, and the kinetic modeling of polyauxic growth / fermentation. Much of his childhood was spent in the country side of Sichuan Province in China, finished high school in 1978 from Luxi High School, in a little town just a few kilometers away from his home of birth. He graduated from Chengdu University of Science and Technology (now merged into Sichuan University) with a BS degree in Chemical Engineering in 1982. His early career started in the chemical industrial city of Lanzhou, China before moving to Canada. He obtained his PhD degree in Chemical Engineering from the University of Alberta in 1992 under Prof. Jacob H. Masliyah. Since then, he worked in the University of Alberta and Alberta Research Council before joining SUNY ESF in 2005. He has over 150 peer-reviewed publications today and maintains strong collaborations with colleagues in China from various universities. He taught a variety of courses including transport phenomena, numerical methods, mass transfer, chemical kinetics, pulp and paper technology, colloids and interfaces, chemical reaction engineering, bioreaction engineering, bioprocess kinetics and systems engineering, biofinery processes, advanced biocatalysis, advanced bioprocess kinetics, and bioprocess engineering. Dr. Liu currently serves as the Editor-In-Chief of the Journal of Biobased Materials and Bioenergy, as well as the Editor-In-Chief of the Journal of Bioprocess Engineering and Biorefinery.