Synthetic Biology: Tools and Applications

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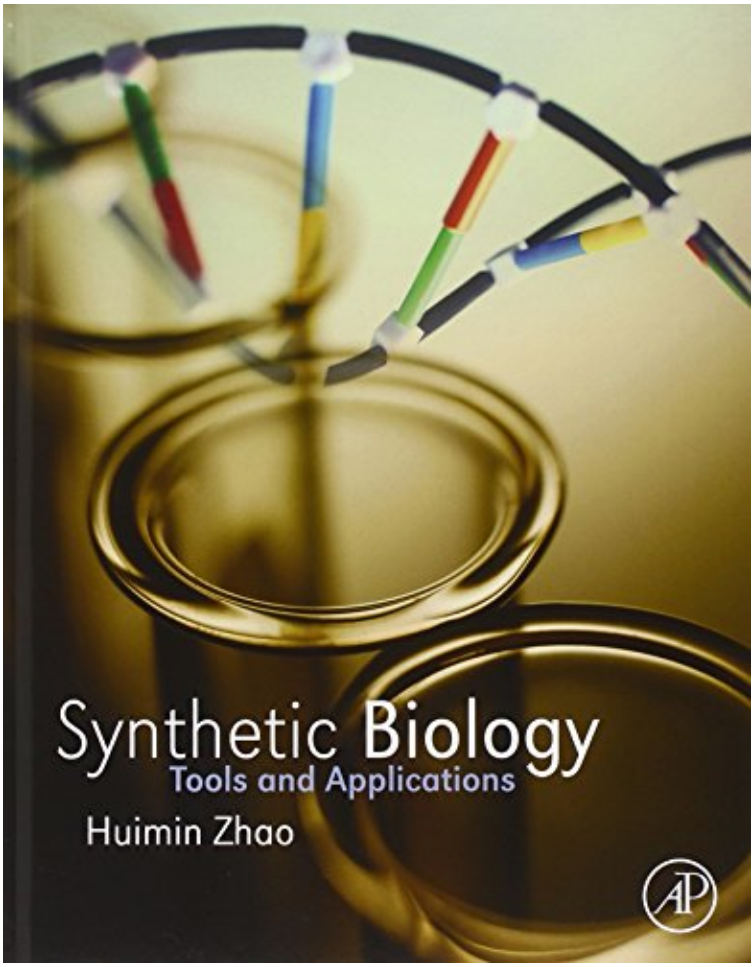

#2546648 in Books Academic Press 2013-06-04Ingredients: Example IngredientsOriginal language:EnglishPDF # 1 11.22 x .79 x 8.69l, 2.51 #File Name: 0123944309352 pages | File size: 58.Mb

From Brand: Academic Press : Synthetic Biology: Tools and Applications before purchasing it in order to gage whether or not it would be worth my time, and all praised Synthetic Biology: Tools and Applications:

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Synthetic Biology provides a framework to examine key enabling components in the emerging area of synthetic biology. Chapters contributed by leaders in the field address tools and methodologies developed for engineering biological systems at many levels, including molecular, pathway, network, whole cell, and multi-cell levels. The book highlights exciting practical applications of synthetic biology such as microbial production of biofuels and drugs,

artificial cells, synthetic viruses, and artificial photosynthesis. The roles of computers and computational design are discussed, as well as future prospects in the field, including cell-free synthetic biology and engineering synthetic ecosystems. Synthetic biology is the design and construction of new biological entities, such as enzymes, genetic circuits, and cells, or the redesign of existing biological systems. It builds on the advances in molecular, cell, and systems biology and seeks to transform biology in the same way that synthesis transformed chemistry and integrated circuit design transformed computing. The element that distinguishes synthetic biology from traditional molecular and cellular biology is the focus on the design and construction of core components that can be modeled, understood, and tuned to meet specific performance criteria and the assembly of these smaller parts and devices into larger integrated systems that solve specific biotechnology problems.Includes contributions from leaders in the field presents examples of ambitious synthetic biology efforts including creation of artificial cells from scratch, cell-free synthesis of chemicals, fuels, and proteins, engineering of artificial photosynthesis for biofuels production, and creation of unnatural living organismsDescribes the latest state-of-the-art tools developed for low-cost synthesis of ever-increasing sizes of DNA and efficient modification of proteins, pathways, and genomesHighlights key technologies for analyzing biological systems at the genomic, proteomic, and metabolomic levels which are especially valuable in pathway, whole cell, and multi-cell applicationsDetails mathematical modeling tools and computational tools which can dramatically increase the speed of the design process as well as reduce the cost of development.

"Synthetic Biology: Tools and Applications. Edited by Huimin Zhao. Academic Press. Amsterdam (The Netherlands) and Boston (Massachusetts): Elsevier. $149.95. xviii 333 p.; ill.; index. ISBN: 978-0-12-394430-6. 2013." - The Quarterly of Biology,September 2014 "Chemical, biological, and biochemical engineers describe tools and methodologies developed for engineering biological systems at a wide range of levels, including molecular, pathway, network, whole cell, and multi-cell. They also explore practical applications of synthetic biology, a branch of genetic engineering that incorporates systems biology."--Reference and Research Book News, August 2013 The proposed book is exclusively focused on synthetic biology. It brings together the thought leaders in this emerging field, giving expert accounts and their opinions of special topics in synthetic biology. This might be the first dedicated, edited book for synthetic biology.--Dr. Qing Lin, State University of New York at Buffalo, Buffalo, NY, USAFrom the Back CoverThis book provides a systematic and integrated framework to examine key enabling components in the emerging area of synthetic biology. Unique contributions from thought leaders discuss tools and methodologies developed for engineering biological systems at a wide range of levels including molecular, pathway, network, whole cell, and multi-cell levels. Many exciting examples of practical applications of synthetic biology such as microbial production of biofuels and drugs, artificial cells, and artificial photosynthesis are included to provide a context for the current state of the field and the challenges that must be overcome in order to move the field forward.About the AuthorDr. Huimin Zhao is the Centennial Endowed Chair Professor of chemical and biomolecular engineering, and professor of chemistry, biochemistry, biophysics, and bioengineering at the University of Illinois at Urbana-Champaign (UIUC). He received his B.S. degree in Biology from the University of Science and Technology of China in 1992 and his Ph.D. degree in Chemistry from the California Institute of Technology in 1998 under the guidance of Dr. Frances Arnold. Prior to joining UIUC in 2000, he was a project leader at the Industrial Biotechnology Laboratory of the Dow Chemical Company. He was promoted to full professor in 2008. Dr. Zhao has authored and co-authored 150 research articles and 20 issued and pending patent applications with several being licensed by industry. In addition, he has given plenary, keynote or invited lectures in more than 170 international meetings and institutions. Eight of his former graduate students and postdocs became professors in the US and other countries. Dr. Zhao received numerous research and teaching awards and honors, including Guggenheim Fellowship (2012), Fellow of the American Association for the Advancement of Science (AAAS) (2010), Fellow of the American Institute of Medical and Biological Engineering (AIMBE) (2009), American Institute of Chemical Engineers (AIChE) Food, Pharmaceutical, and Bioengineering Division Plenary Award Lecturer (2009), the American Chemical Society (ACS) Division of Biochemical Technology Young Investigator Award (2008), Outstanding Overseas Young Chinese Scholars Award (2007), DuPont Young Professor Award (2005), National Science Foundation CAREER Award (2004), Dow Chemical Special Recognition Award (1999), Xerox Award for Faculty Research from UIUC College of Engineering (2005), Petit Scholar from UIUC College of Liberal Arts and Sciences (2006), and University Scholar from UIUC (2007). Dr. Zhao served as a consultant for over 10 companies such as Pfizer, Maxygen, BP, Gevo, and zuChem, and a Scientific Advisory Board member of Gevo and Myriant Technologies. He is also an advisor to the Department of Energys Biological and Environmental Research program. Dr. Zhao is an Associate Editor of ACS Catalysis and an editor of ACS Synthetic Biology, Journal of Industrial Microbiology and Biotechnology, and Scientific Reports (Nature). His primary research interests are in the development and applications of synthetic biology tools to address societys most daunting challenges in human health and energy, and in the fundamental aspects of enzyme catalysis, cell metabolism, and gene regulation.