

# Preface

In order to counter the increasing global demand for energy, a multifaceted approach is needed. Renewable bioenergy produced from various types of biomass, especially lignocellulosic biomass, is an important source of energy supply. Such biomass sources can be agricultural wastes or direct harvests from high-yield energy crops. Lignocellulosics are recalcitrant by nature's design. Fermentable sugars must be liberated from the biomass before ethanol fermentation. Pretreatment is necessary and it is often an expensive part of the overall lignocellulosic ethanol process, which is critical to the economic feasibility of lignocellulosic ethanol. A good pretreatment method makes the subsequent enzyme hydrolysis step much more effective while minimizing the formation of fermentation inhibitors. This book emphasizes on potential on-farm and tactical mobile applications that use green pretreatment and processing methods without the need for on-site waste treatment. The first chapter in this book, discusses plant cell wall structures and their impact on pretreatment. Each subsequent chapter is dedicated to one pretreatment methods. These methods include mechanical pretreatment, biological pretreatment, hydrothermal pretreatment (including steam explosion), supercritical CO<sub>2</sub> explosion pretreatment, and ionic liquid pretreatment. Because there a huge variety of different lignocellulosic biomass types that are potential targets, no single pretreatment is expected to be the universal choice. Some of the pretreatment methods are niche applications that are particularly suitable for the desired small-scale on-farm or mobile operations that eliminate the need to transport bulky raw biomass feedstock. Mobile or tactical bioenergy production is already a feasible option for military forward operating bases in a war zone where fuel costs can be ten times higher than normal.

Athens, OH, USA

Tingyue Gu



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