

# Preface

Steam explosion technology is considered as one of the most cost-effective pretreatments of biomass. Steam explosion is the process in which the solid material especially lignocellulosic feedstock is pretreated with saturated steam or high-pressure gas for a certain time, and the solid material is then instantaneously exploded. In 1928, W.H. Mason from USA invented firstly the steam explosion technology, which only used 7–8 MPa saturated steam as a medium steam. This steam explosion technology was used only for the research of fiberboard preparation. Due to high pressure, this steam explosion technology is difficult to be applied. However, from the beginning of the 1980s, the steam explosion technology has attracted more attention again.

After decades of development, the steam explosion technology has made great progress. Most research still uses chemicals to pretreat biomass feedstocks at home and abroad. Based on the differences in the chemical composition and structure of straw and wood, author proposed the low pressure and unpolluted steam explosion technology of straw without any chemicals addition. And then the new low pressure and unpolluted steam explosion technology is extended to tobacco processing, herbal extracts, cleaning degumming of hemp fiber, etc.

On the basis of steam explosion, author extended the explosion media from the traditional steam to mix media, and developed inert medium steam explosion technology and mixed media steam explosion technology. Steam explosion technology has been used to the gradient temperature steam explosion process and other low-temperature steam explosion process of herbal treatment. A series of clean, efficient, and economical combinatorial pretreatment technologies taking steam explosion as the core have been invented, by which a clean and efficient separation of biomass components is achieved. Explosion technology is no longer limited to a single steam explosion. The media of explosion technology have been upgraded to multi-gas medium based on the requirements of process. Because the steam explosion media have been developed to a variety of gaseous medium, the steam explosion is named gas phase explosion in order to enrich and enhance the connotation of traditional steam explosion technology. Currently, gas explosion

technology is mainly applied for lignocellulosic feedstock, whose common aim was to achieve a multi-component separation and utilization, namely biomass refining.

In 2006, we published the first monograph about the introduction of steam explosion technology. Based on our research of gas explosion technology and academic exchange with domestic and foreign peer in recent decades, authors write this book—Gas Explosion Technology and Biomass Refining. Authors hope to throw out a minnow to catch a whale and promote the better development of gas explosion technology.

This book analyzes the principle of gas explosion technology and the separation mechanism of solid material multi-component, and introduces gas explosion equipment and process. Additionally, the application process of biomass refining is described systematically. This work was financially supported by the National Basic Research Program of China (973 Project), the National High Technology Research and Development Program of China (863 Program), and the Knowledge Innovation Program of the Chinese Academy of Sciences. In addition, the works of my doctors and masters were essential preconditions for publishing this book. In particular, Dr. Zhihua Liu, Master Lanzhi Qin, Master Yang Liu, Dr. Wenjie Sui, Dr. Guanhua Wang, Dr. Yuzhen Zhang, Master Meixue Shao, Dr. Guanhua Li, Dr. Litong Ma, Dr. Junying Zhao, and Dr. Ning Wang participated in writing this book. Many references of our predecessors and colleagues are cited. I wish to express my sincere thanks to all of them.

Some errors may exist in this book. I sincerely hope to receive criticism and guidance from readers in this regard.

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