PREFACE

(to the English edition)

Although low-energy ion beam biotechnology has been the subject of active research in a few countries, particularly China, for over a decade, and impressive accomplishments in biology and agriculture have been achieved there, the field is new and has not yet been well recognized by most of the world. At Chiang Mai University we have known for quite some time that Prof. Yu Zengliang, Director of The Key Laboratory of Ion Beam Bioengineering, Institute of Plasma Physics, Chinese Academy of Sciences, was a founder of this new, highly interdisciplinary branch of science, and that he has carried out research in this field since the late 1980s. Stimulated by Prof. Yu's achievements, Thai scientists, joined by Chinese and American colleagues, organized research in this area at Chiang Mai University for serving economic development in Thailand. Only in a few short years, we have made great progress. In the laboratory of Fast Neutron Research Facility, a specialized bioengineering ion beam line has been installed. Research on both fundamental interactions between ions and biological organisms and applications to agricultural and horticultural crop mutation breeding and gene transfer has been carried out. A number of important results have been achieved and published. Besides having worked independently, the Thai researchers have had the pleasure of frequent and close academic exchange with Prof. Yu Zengliang and his colleagues. As work progressed, the need for a text elaborating the fundamentals of low-energy ion beam biotechnology grew increasingly clear. We recently learned that Prof. Yu Zengliang had written and published a book in Chinese on the fundamentals of this fascinating technology – precisely the kind of monograph needed. The idea of translating Prof. Yu's book into English was immediately suggested by Prof. Thiraphat Vilaithong, President of the Thai Institute of Physics, and warmly supported by Prof. Yu Zengliang himself. The original Chinese edition of the book consists of twelve chapters and an appendix. In order to reflect more recent developments in research on the technology, Prof. Yu has added two chapters (Chapter 13 and Chapter 14 of this English edition) as well as some parts in Section 2.4. of Chapter 2, Section 6.6. of Chapter 6 and Section 11.3. of Chapter 11. Translating Prof. Yu's book has been a great challenge, as the job involves aspects of physics, biology, agriculture, chemistry, and more. We needed assistance and consultation. We would like to sincerely thank those who have made important contributions to the creation of this English edition of Prof. Yu's book. They are

- Prof. Yu Zengliang, for his full support and suggestions for the translation and kind cooperation and concern;

- Dr. Gordon L. Hiebert, for his complete reading and commenting of the book manuscript, two times;
- Dr. Xu An and Dr. Hu Zhiwen, for their enthusiastic assistance in coordinating the work between the Thai and Chinese sides and effective management of the work in China;
- Fifty-two graduate students, most of whom are Ph.D. candidates, of The Key Laboratory of Ion Beam Bioengineering, Institute of Plasma Physics, Chinese Academy of Sciences, for their invaluable assistance in checking the translations and re-preparing many figures and references;
- Prof. Pimchai Apavajrut, Prof. Somboon Anuntalabhochai, Prof. Adisorn Krasaechai, Dr. Somjai Sangyuenyongpipat, and Mr. Boonrak Phanchaisri of Chiang Mai University, for their reading of and commenting on various chapters of the book manuscript;
- Dr. Liu Ming, for her help in managing relevant material for translation in the fields of biology and chemistry;
- Personnel at the Department of Physics, Faculty of Science, Chiang Mai University, for their support and concern;
- The Thailand Research Fund for its support;
- Mr. Aaron Johnson of Springer Science & Business Media for his efforts in coordinating the publication;
- Our wives for their long-suffering support and patience.

Yu Liangdeng
Thiraphat Vilaithong
Ian Brown

June 2004
Chiang Mai, Thailand