# Closing Remarks

*Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.*

Winston Churchill
November, 10, 1942
Mansion House, London

By this point, it is close to the end of our writing on this book. However, this is not the end, even not the beginning of the end, for the development of the Xu-Tec process—surface metallurgy technology with the double glow discharge plasma.

I am glad to see that, in the past almost 50 years in my life, our great effort have been devoted whole-heartedly to the development of surface metallurgy technology, from experimenting plasma nitriding technology to understanding this science, from discovering the double glow discharge phenomena to engineering development of Xu-Tec process for surface metallurgy applications, and from fundamental understanding of double glow discharge plasma technology to exploring its industrialization for new material products with better surface performance. We have advanced through a long journey with many challenges and hard-working, and also many encouragements and supports.

Looking back to the 1970s, so many researchers were actively engaged in the research and promotion of plasma nitriding technology in China. A special "Academic Committee for Ion Bombardment Chemical Heat Treatment" was established by Ministry of Machinery Industry of China, responsible for leading and promoting the development of plasma nitriding technology.

Compared with Plasma nitriding technology which can only be applied to a few gaseous non-metal elements, the double glow discharge plasma surface metallurgy technology has led us applying almost all chemical elements in the periodic table for the surface alloying modification of solid materials. It is considered as the major breakthrough in the materials industry.

Double glow plasma surface metallurgy technology has been proofed to be a typical resource saving and environmental friendly technology. With the continuous consumption of alloying elements on the earth, the advantages of the Xu-Tec process will be more prominent to save alloy material resources. And it will be an



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important development direction in the future, to be beneficial to our materials industry and the mankind in the world.

At the close of this writing, I have been full of excitements and thoughts. Looking back on my life and the trail of the Xu-Tec development, I feel deeply to have owned to many people who have given me knowledge, encouragement, support, and a concept of life as well.

First, I am very grateful to my alma mater—Beijing Fourth High School. During my three-year study in this school, I set up a healthy and optimistic outlook on the life. The spiritual belief and the guiding philosophy of the life have laid out a foundation for my life.

Secondly, I will never forget my mentor Professor Gaomei Cheng. In that critical moment when I just graduated from the college, he came forward with overcoming all difficulties, and determinedly left me in the university as a teacher determined my road of life and enabled me to engage my favorite educational and scientific work which had satisfied my love and interest for science and technology. I deeply miss Mr. Mei Liu and Professor Guitong Yang, two former presidents of the Taiyuan Institute of Technology (now Taiyuan University of Technology). They had always given their beliefs, encouragement and support on me at the crucial moment, or in a trouble time. In addition, Professor Hengde Li from Tsinghua University, Professor Yi Wang from Central Iron & Steel Research Institute, and Mr. Zongrong Wang from Ministry of Science & Technology of China, are very important Bole-type characters in my life, to make me deeply understand of a person's growth and development with the help and support of others.

Dr. Roland Lau, a Chinese-American in USA, is deeply grateful for his initial recognition of the significance of the Xu-Tec process and help for applying the first patent of this technology in the United States, as well as his contribution of winning two U.S. government research funding for the technological development project.

I would also like to give my out-of heart gratitude to Professor James Thompson and Professor Robert Tzou at University of Missouri for their care, encouragement and help to me in many years to now.

Furthermore, I would also want to give my deep appreciation to Dr. Frank Fulin Xiong, the co-author of this book, for his encouragement, patience, and many fruitful and knowledgeable discussions during the book writing and in the cause of the technology development, and also for his long-term friendship and open mind-sharing communication with me.

Finally, I would like to express my sincere gratitude to my wife and two sons for their love, encouragement and support for all of my life.

The momentum to drive me to write this book is relying on my firm belief in this surface technology. From the technological success of plasma nitriding to many experimental accomplishments of the double glow discharge plasma metallurgy process, I believe that this technology can comprehensively improve the performance and quality of machinery manufacturing parts, saving a lot of precious metal elements for the materials industry, and for the benefit of our global society.

Now, this is to end of the book writing. It would be the end of the beginning of the Xu-Tec technology's research and development. However, this is, perhaps, the

real beginning of its technological industrialization. We are looking forward for its bright and fruitful future.

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