Preface

I wrote this book for scientists who are interested in moving their research on batteries, fuel cells, and solar cells to synchrotron radiation facilities, and neutron centers and free electron lasers. This is not one of the expert books about one particular experimental technique or one particular theory. It is a book for beginners who want to get an impression on how to combine experiments from physical chemistry, electrochemistry, chemical engineering, and biophysics with X-ray and neutron methods. It contains a collection of my original research work in electrochemical energy storage and conversion from 1997 onward, with the latest experiments performed in 2023. I also included important or pioneering works from other researchers.

Beginning in 2010, I organized several workshops with my colleagues on this synergetic topic at the Advanced Light Source Users Meeting, Symposia at the Materials Research Society Spring and Fall Meetings and two International Exploratory Workshops on X-rays and electrochemistry at Empa in Switzerland. In 2010, I was also approached the first time by a leading international publisher and asked to write a book about synchrotrons and electrochemistry. Since 2011, I have served on the synchrotron user representation boards of the Swiss Lightsource, the Advanced Light Source, and more recently as Swiss delegate for the European Synchrotron User Organization.

While the field of electrochemistry of synchrotrons used to be a niche for only a few pioneers, more and more researchers from prestigious schools have entered the field for their materials studies. Concomitantly, some synchrotron divisions hired staff with electrochemistry expertise for beamline work. This field has really grown in the last 15 years.

You may notice that I have tried to cover biophysics and X-ray and neutron studies on bioelectrochemical systems. This is a field where in the future more activities will emerge. There is more bioelectrochemistry in biophysics than we may be aware of. It may be a promising opportunity for curious researchers to invest time and interest in this field and eventually touch gold.

When you are reading this book and decide to move to electrochemistry with synchrotron methods or the other way around, I hope you get your inspiration, satisfaction, and joy with your own work at synchrotron centers, neutron facilities, and free electron lasers as much as I did. Then you will be well-off.

Ennenda, Switzerland, Spring 2022 Artur Braun

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