Preface

This book is the first attempt to provide a comprehensive presentation of the physics and engineering concepts behind emission detector technology. Over the course of 35-year career in experimental physics, I have been involved in a variety of R&D projects that spans the study of effects associated with quasi-free electron emission, from small, gram-scale quantities of non-polar dielectrics for the purpose of exploring all possible working media for emission detectors, to the recent development of huge, ton-scale, astroparticle emission detectors used in the search for cold dark matter in the Milky Way. Consideration of this research itself can serve as a good example of the evolution of a new technology from basic concept to practical application.

In this book, special attention has been paid to the properties of non-polar dielectrics, since such media can be used for effective detection of penetrating radiation in many important practical applications, ranging from medical imaging to nuclear reactor diagnostics. Applications of emission detector technology are discussed in the concluding chapter of the book. More than two hundred references have been cited in this book and can serve as sources of more detailed information on particular subjects. For additional reading on relevant detector technologies, one can recommend *Liquid Ionization Detectors* (Atomizdat, 1983) by Barabash and Bolozdynya, *Noble Gas Detectors* (Wiley, 2006) by Aprile, Bolotnikov, Bolozdynya and Doke, and, of course, *Radiation Detection and Measurements* (3rd edition, Wiley, 2000) by Knoll, whose comments on the technology of noble gas detectors inspired me to work on this monograph.

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