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Prologue

Hooke College of Applied Sciences is most fittingly named in honor of Robert Hooke (1635-1703). Hooke (pronounced "hook"; the "e" is silent) was a brilliant English scientist, microscopist, physicist, engineer, surveyor, and architect. In microscopy he is best known for his astonishing landmark book, *Micrographia*, which he wrote and illustrated in 1665 after years of study while still in his late twenties, looking at virtually everything with his improved compound microscope, equipped with an iris diaphragm of his own invention. This was the first book on microscopy in English, and in it he described and illustrated fungi, chemical crystals, the mosquito, the flea, and hundreds of other specimens. Hooke was the first to apply the term "cell" to the building blocks of tissue, after looking at a thin section he had made of cork. He has been described by R.T. Gunther as the English father of microscopy, and his book has been described as "probably the most influential book in the entire history of microscopy" (Jeremy Norman).

Hooke was the first Curator of Experiments at the Royal Society, where he designed many pieces of physical science demonstration apparatus, and performed public anatomical dissections of animals. He designed an early balance spring watch, and formulated what is today known as Hooke's Law of Springs. In 1664, Hooke, as astronomer, published his findings on the rotation of Jupiter based on his observations of the movement of the Great Red Spot. As though any one of these accomplishments were not enough, he was appointed London's Chief Surveyor after the Great Fire of 1666, and helped his friend Sir Christopher Wren lay out and rebuild London.

Because of Hooke's remarkable achievements in so many fields, it is appropriate that this College is named after him.

In addition to the offering of courses for professionals in the analytical and applied sciences fields, Hooke College is pleased and proud to collaborate with high schools, colleges, and universities to develop interest in and understanding of microscopy for future generations.

Preface

This manual of essentials for the setup and operation of a polarized light microscope for microscopic particle characterization and identification grew out of a need on the part of the Hooke College of Applied Sciences, a member of The McCrone Group, for a suitable modern textbook for use in their microscopy courses. Textbooks involving use of the polarized light microscope that are already available are almost exclusively intended for students of mineralogy and the study of rocks. What was needed was an up-to-date, fresh approach to applied polarized light microscopy as required for such diverse applications as industrial problem solving, contaminant identification, bioterrorism and other hazardous material identification, trace evidence analysis, household dust and air pollution analysis, particulate health hazards, product manufacturing monitoring, degradation analysis, paint and pigment analysis, etc. The essentials described in this manual have a rich history going back hundreds of years and are a heritage still eminently useful and applicable in this modern age, and for the forseeable future. In addition to its use in Hooke College classes, the present edition will also find use in other institutions of learning, and can be used for independent study.

Acknowledgments

This manual has been reviewed by Charles A. Zona, Dean of Hooke College of Applied Sciences, Westmont, Illinois; Christine Gorman, Admissions Specialist at the College—and my sometimes amanuensis; Peter M. Cooke, Founder and Principal Instructor, MICA, Chicago; and Jeff Hollifield, Founder of Micro Analytical, Mauldin, South Carolina, Lecturer of Chemistry, College of Science and Mathematics, Lander University, Greenwood, South Carolina, and Adjunct Professor at the College. All of these reviewers offered helpful comments, each from their own unique perspective and area of expertise, for which the author is most grateful. Daniel E. Kile, Scientist Emeritus, United States Geological Survey, and Adjunct Professor at the College completed a technical and editorial review and made many welcome suggestions. Several staff members of McCrone Associates, Westmont, Illinois contributed in some way, particularly David A. Wiley, President of McCrone Associates; Pat Brown who typed text; Joseph G. Barabe, former Director of Scientific Imaging and current Adjunct Professor at the College, photography; and Leslie I. Bolin, Graphic Designer, who formatted the work into its present attractive and easy-to-use form.

My special thanks go to Donald A. Brooks, Chairman & CEO of The McCrone Group, for providing the opportunity and the support necessary to create this book.

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