Preface

For more than a century, microscopy has been a centerpiece of extraordinary discoveries in biology. Along the way, remarkable imaging tools have been developed so that we can now observe biological processes at the subcellular level in live cells, visualize detailed intracellular architecture in three dimensions, quantitate the elemental composition of subcellular components, and study the structure and dynamics of isolated molecular complexes.

A key attribute of many of the different microscopy techniques is their ability to generate images at spatial resolutions down to the nanoscale, which is the length scale pertinent to individual macromolecular assemblies and subcellular ultrastructure. In *Nanoimaging: Methods and Protocols*, we therefore present a diverse collection of techniques and methodologies in microscopy capable of providing images of isolated molecular complexes, cells, and tissues at nanoscale spatial resolution. The book is divided into four parts, each containing several chapters pertaining to a given field. *Part I* covers light microscopy techniques with a special emphasis on imaging at spatial resolutions that go beyond the historically and physically important Abbe limit (diffraction limit). *Part II* contains several established and powerful techniques in electron microscopy for high-resolution imaging of molecules, cells, and tissues, in both two and three dimensions. *Part III* highlights the unique methods that reveal the advantages of scanning probe microscopy for imaging and probing macromolecular complexes and membrane surface topography. *Part IV* closes with chapters on correlative microscopy techniques, soft X-ray tomography, and secondary ion mass spectrometry imaging. Keeping up with the tradition of the Methods in Molecular Biology series, chapters are largely composed of detailed protocols describing a specific experimental procedure.

We regret that this volume simply could not possibly contain all of the latest advances on nanoscale imaging that have abounded in the literature in recent years (e.g., all the newest modalities of super-resolution optical microscopy and the many different categories of scanning probe microscopy). We also had to leave behind established techniques in optical microscopy as we consider them not strictly "nano" in the context of this volume.

The new surge of interest in microscopy that we now witness has once again elevated the importance of the microscope to biomedical research, a level that surely provides a new foundation for exciting new discoveries. One can only begin to imagine the extraordinary ways with which molecules, cells, and tissues will be "dissected" at the nanoscale with ever-increasingly powerful imaging tools. We thus believe that *Nanoimaging* is a timely volume, and we hope it will achieve its mission of highlighting many of the most exciting possibilities in microscopy for the investigation of biological structures at the nano length molecular scales.

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