

Preface

Despite the fact that optics is undoubtedly one of the oldest fields of physics, there has been no decade without new discoveries (or rediscoveries). The history of near-field optics is both recent and ancient. It is recent because it is the invention of Electron Scanning Tunneling Microscopy which pushed ahead the optical near-field concept and enabled its emergence as a new powerful nano-characterization tool. It is ancient since evanescent fields and more generally non-propagating fields have been known for a very long time. Newton is often cited as the discoverer of evanescent waves, but we can suppose that the peculiar phenomenon of total reflection had intrigued scientists a long time before him. Evanescent waves are still today a fascinating phenomenon since they seem to be an intermediate state between light and matter and though still imperfect and incomplete their understanding contributes to a deeper knowledge of the world of Physics.

Writing a book in near-field optics is a complex task since this new field of investigation is the converging point of several apparently unrelated research domains. Therefore, finding a leading main thread is tricky, even impossible. For that reason, this book intends to present and analyse the near-field concept and near-field microscopy according to a global approach tackling both theoretical aspects and experiments. Every chapter is intended to be sufficiently self-explanatory, allowing the reader to extract what he is looking for, whether in experiment, in theory or even in fundamental optics. This book must be seen as an aperture towards near-field optics rather than an exhaustive and definitive analysis.