

# Preface

The primary goal of the present volume is to discuss the basic physics of semiconductor macroatoms at the nanoscale as well as their potential application as building blocks for the realization of new-generation quantum optoelectronic devices. The book provides a review state-of-the-art of fabrication and characterization of semiconductor quantum dots aimed at implementing single-electron/exciton devices for quantum information processing and communication. After an introductory chapter on the fundamentals of quantum dots, a number of more specialized review articles will provide a comprehensive picture of this rapidly developing field. More specifically, the strongly multidisciplinary activity presented in the volume includes state-of-the-art nanofabrication and optical characterization, fully microscopic theoretical modeling of non-trivial many-body processes, as well as design and optimization of novel quantum-device architectures. Since most of the scientific activity presented in the book is the result of a number of cross-collaborations within the large-scale European Project *Semiconductor-based implementation of Quantum Information Devices (SQID)* within the *Future and Emerging Technologies (FET)* programme, the volume offers a cohesive perspective on the many research areas involved.

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