



## METADATA

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### Abstract

State-of-art microprocessors and memories with a density of around one billion transistors per square centimeter, can process data with unprecedented speed and power efficiency. Their combination with sensors, actuators, energy microsystems, and waveguides in an integrated and compact form offers powerful, interconnected, portable information systems, such as smartphones. These devices can run advanced software, providing complete services of such sophistication that they are often called Artificial Intelligence. The availability of this steadily growing hardware technology is usually taken for granted, resulting in a shift in the interest, and enthusiasm, of young engineers and scientists, towards software. For example, augmented reality technology is considered more to be an achievement of digital image processing algorithms, and less an achievement of the corresponding advances in camera and micro-optics, and their integration with motion microchips. However, the invention of new, and especially transformative, services typically emerges from hardware novelty, i.e. prototyping and demonstration of new and improved functionalities.

Thus, the microsystems and nanostructure fabrication are currently a technology of primary geopolitical significance. This book offers an introduction to the basic microsystem and nanotechnology fabrication techniques, for young scientists and engineers. The general research and development environment and key challenges are discussed. The conventional microelectronic fabrication technology is presented, including laboratory specifications, materials, the method of lithography, and the main material addition, subtraction, and modification processes, at the wafer level. Subsequently, more specialised techniques are described, including deep etching, fabrication of three-dimensional structures, and advanced lithography methods. Chapter 4 presents a systematic method of organising processes into process flows, focusing on the fabrication of functional devices, including process flow design rules and examples. Finally, an overview of nanotechnologies currently used in commercial electronics is given. Overall, the book covers the basic topics and methods required for microsystem and nanostructure prototyping.

