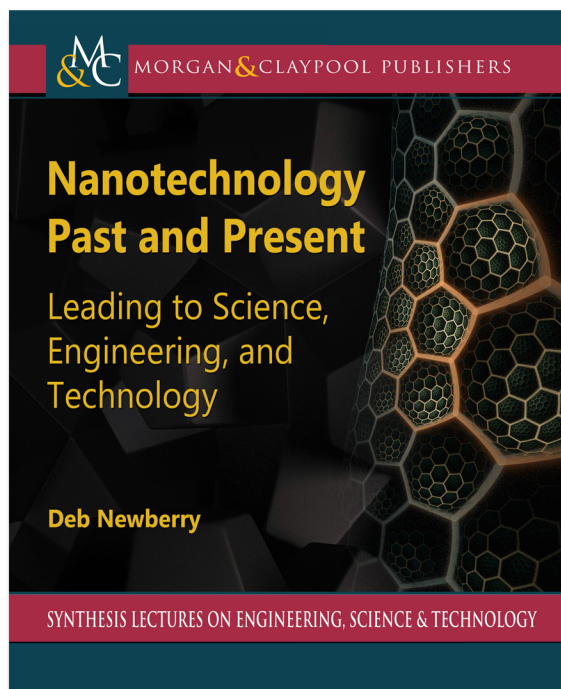


▶ The history, mathematical concepts, and instruments required to study and manipulate the world at the atomic scale, followed by the connectivity of nanotechnology to traditional sciences and emerging technologies.



## **Nanotechnology Past and Present** *Leading to Science, Engineering, and Technology*

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Nanoscience and nanotechnology, the application of the research-based nanoscale science, have changed significantly over the last three and a half decades. The “bucky” ball, 60 carbon atoms arranged like a soccer ball, and an often-used symbol of nanotechnology, was discovered in 1985 and 4 years later scientists at IBM were able to manipulate xenon atoms on a surface. In the intervening years, nanotechnology has evolved from a singly focused research topic to an understanding that infiltrates every

aspect of science and engineering disciplines. In addition, nanotechnology, and both naturally occurring and engineered nanomaterials, have become the focus of legal, environmental, and application and regulation disciplines. The first portion of this text serves as an introduction to nanotechnology: the history, mathematical concepts, and instruments required to study and manipulate the world at the atomic scale. The later portion of the text discusses the connectivity of nanotechnology to the more traditional scientific disciplines as well as emerging technologies.

This text can serve as an introduction to the nanoscale for science, computer science, and engineering disciplines. It can also provide a valuable foundation for disciplines such as industrial hygiene, architecture, sociology, ethics, and the humanities. There does not exist an educational discipline, market segment, or career avenue which will not be impacted by nanotechnology.

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