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Materials 3.0 - Nanomaterials and The Next Revolution in Materials¹

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Materials have played a central role during all advances in human civilization as far back as recorded histories exist. It is possible to characterize the application of materials in technologies as three distinct eras. In the first era, during the industrial revolution materials were mainly used for structural and functional applications. In the second era which includes the information technology revolution, material properties were exploited by integrating them in structures and combining different materials in a systematic manner. In the next era, we indicate that materials application will enter the next era in which size will be used to design materials with targeted properties. In this, for the advent of so-called “smart” materials, nano dimensions (between atomic and macrostructures) where both properties and synthesis will lead to many new applications, where differences between devices and materials will disappear. “Nanomaterials” will have newer properties because of many new phases the ability to manufacture the using nanotechnology. However, this will also pose challenges in terms of modeling and characterization given the complex nature of the materials and also due to increasing effects of interfaces of these materials. We will outline with examples from multiple industries.

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