

Progress in one-dimensional nanostructures

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ABSTRACT

In recent years, the globe has been confronted with a large number of challenges related to power supplies, atmospheric pollution, and greater energy demand. Therefore, renewable energy sources or green energy have gained a great interest among researchers to deal with the aforementioned challenges. Scientists have sought to address these obstacles by developing groundbreaking functional technologies using nanomaterials. One-dimensional (1D) nanostructures, such as nanowires (NWs), nanobelts (NBs), nanoneedles (NNs), nanorods (NRs), nanotubes (NTs), and nanofibers (NFs), have gained widespread attention for various applications such as nano-electronics, nano-devices, dye-sensitized solar cells, biomedicine tissue engineering, Li-ion batteries, and nano-photonics. This study is focused on the synthesis procedure of various methods, characteristics, and properties of 1D nanostructures. Besides, ultra-modern 1D nanostructures-related studies have been covered and evaluated comprehensively to improve nanostructures' physical and mechanical properties and overall performance. Also, the 1D nanostructures can be the future in more applications such as energy source, medical, battery, etc., and dispense as an energy source with fossil fuels. This review paper contains the following sections: Synthesis methods, physical properties characterization, mechanical properties characterization of 1D nanostructures, the environmental effect, electrical and optical characterization, application of 1D nanostructures in energy storage, technical challenges, and limitations of the study, and conclusions. This review study gives the necessary fundamental knowledge regarding the 1D nanostructures as well as mechanical behavior towards their promising applications. The impact of these novel nanostructures towards a rapid advancement in future applications can be considered the next step to boost the knowledge to contribute substantially to the scientific community.

KEYWORDS

1D nanostructures; Nanowires; Physical characterization; Mechanical characterization; Energy Storage

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