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Flexible One-Dimensional Nanostructures: A Review

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This review discusses the recent reports on one-dimensional (1D) nanostructures with unusual flexibility. We discuss the importance that flexibility could have in future applications of nanowires and other nanostructures, and detail the two main approaches that have been followed to this day to synthesize highly flexible 1D nanostructures. One approach is based on making crystals in which one or two dimensions of the structure are comparable in size with the unit cell. Such thinness has been shown to provide unusual flexibility. The other approach conjoins hard nanostructures with flexible joints.

Key words: Flexibility; One dimension; Nanostructures; Methodology

1. Introduction

The interest in nanowires has been largely associated with their integration in electronic circuits, due to their one-dimensional (1D) morphology and nanoscale diameter. Intel and other companies are now working out industrial scale processes for the fabrication by top-down lithography of integrated circuits with 7 nm features: the margin of improvement that bottom-up free-standing nanowires can bring to traditional electronic application is rapidly decreasing. Niche applications that involve non-planar geometries and soft substrates (e.g., integration of electronic devices with living tissues) that are currently incompatible with