

Nanotechnology for Science and Engineering

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Since the early days of carbon nanotube (CNT) discovery,¹ several efforts have been dedicated to recognize the characteristic features of this novel material for applications in various fields of science and engineering employing both of computational and experimental procedures.²⁻⁵ Although the pure CNT has been seen interesting enough to be investigated, but other related nanostructures have been also arisen in addition to the pioneering CNT.⁶⁻¹⁰ The scientific aspects have been seen for years in the academic research laboratories to provide insightful information of nanoscience. Furthermore, scale-up activities have lead nanoscience to nanotechnology to be more applicable for human needs and life quality. In addition to nanomaterials, nanodevices have been grown by expectations for applications in fine systems. Molecular motors and robots are examples of such nanodevices with attractive features and applications. Let's think about the size of mammalian cell diameter, in micrometer, the nanodevice could work at the size of nanometer even smaller than cell diameter, wonderful! Yes, the cell therapy is one of the important expected applications of nanotechnology to repair damaged cells inside the human body. For tissues, nanotechnology could work very well to make small-size strong bones to be localized in different parts of human body. For targeted drug delivery purposes, nano-carriers have been seen with dual activities of carriers and sensors to deliver the drug to the specific target avoiding side

effects. In addition to such novel expected applications in living systems, nanotechnology showed several other applications for modern life systems. From the nanomaterial-included steels to gas sensors are such applications of nanotechnology for modern life systems. Moreover, hygienic auto cleaning materials are such important clues of nanotechnology for applications in clean areas of life systems. Water-proof cloths are such examples for walking in the rain but not getting wet of raining waters. In this case, no water will be remained at the surface of cloth or glass or any other surfaces coated by water-proof nanolayers. For civil engineering, nanotechnology could help to provide more strong constructions resistant against destructive and corrosive factors. It is very much obvious that nanotechnology is important to all areas of life systems, inside and outside of human body. However, nanosafety is also an important dominant task for applications of nanotechnology. As the size is too much small, general health problems could be arisen from such small-size technology. Unwanted breathing CNT or its diffusion inside the human body could yield hazardous problems for human health system, causing cancer for example. Therefore, although nanotechnology is very much important for nowadays modern life systems, but it is not an easy technology and further careful investigations are still required in complimentary to current advances and developments. Nanotechnology is such a dynamic approach, still moving forward.

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