

The sustainability of nanotechnology: A Scientific Approach

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Abstract

Information age marks revolutionary changes in all aspects, but most notably in the domain of nanotechnology. The technological revolution involves nano-materials, engineered or otherwise, that have great mechanical stability, high thermal conductivity, large current carrying ability, and tremendous flexibility in terms of compatibility with other materials. Unfortunately, much of the excitement about nanotechnologies has been diminished due to the fact that most of these technological products are inherently toxic to the environment. As such, they are unsustainable. In this paper, the origins of unsustainability in selected technologies are revealed through sustainability analysis based on a comprehensive criterion. A newly developed scientific theory, which is free from paradoxical assumptions of the currently used theories, is used to construct a guideline for sustainable material development. An array of novel materials for a wide range of applications is proposed. Sustainability analysis of these materials is performed. It is shown that these materials are technologically more effective than their conventional counterparts. In terms of environmental sustainability, they are shown to be inherently beneficial to the environment. As a consequence, the engineering problem becomes that of maximizing value addition instead of minimizing waste. This material conversion instead of waste disposal opens up the prospect of zero waste engineering. With this double dividend, products of nanotechnology satisfy simultaneously all economical and environmental constraints, thus removing century old misconception that environmental sustainability must come with an economic cost.

Biography

M R Islam, PhD is known as the most published engineer in the world. He has coined terms, such as 'green petroleum' and 'sustainable petroleum development', 'economics of intangibles', 'zero waste engineering', etc. His work has created a paradigm shift in a wide range of applications, spanning through various disciplines. His most notable contribution is in the areas sustainability, environmental integrity, greening of petroleum and pharmaceutical industries, and knowledge modeling, on which topic he has written dozens of books and nearly 800 research papers. His upcoming book is: Sustainability of Nanotechnology to be published in 2019. His latest work is captured in his books: Economically and Environmentally Sustainable Enhanced Oil Recovery, Scrivener-Wiley, 2019; Science of Climate Change, Scrivener-Wiley, 2019; Economics of Sustainable Energy, Scrivener-Wiley, 2018; and Petroleum Reservoir Simulations: A Basic Approach, Elsevier, 2019.

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