A Literature Review of Nanotechnology

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Abstract: ***Many sectors, including information technology, electricity, environmental science, pharmacy, home security, food safety and transport allow nanotechnology to significantly improve and even revolutionise, among others. Recent advances in chemistry, mechanics, material science and biotechnics are studied today in nanotechnology in order to produce new materials with unique qualities as their nanometer-sized architectures are defined. This paper discusses the numerous nanotechnological developments of the last few decades.***

Keywords: Nanotechnology, Environmental Science, Agriculture, Food safety, Engineering.

INTRODUCTION

It is exacerbated by the rising need to preserve our climate that the world's need for energy needs are being fulfilled. Several scientists are investigating ways of improving safe, accessible and renewable energy, as well as ways to reduce energy usage and to mitigate environmental toxicity [1]. Nanotechnology solar panel experiments are more successful in transforming sunlight to energy than conventional designs that pledge in future cheap solar power. Cheaper and easier to install, nanostructured Solar Cells can use print-like production processes and are assembled in compact sheets, rather than separate plates [2]. Nanotechnologies already have a higher power density and are longer to retain the storage charge (Jalaja and others 2016; Najim et al. 2015; Maine et al. 2014), which are being used for a variety of new forms of battery which are less inflammable, quicker to charge, more powerful and more light weight. In an environmentally benign production process, a new lithium-ions battery model uses a common, nontoxic virus. In order to improve the hydrogen membrane and storage materials and the catalysts needed to produce alternative transport systems fuel cells at reduced cost, nanostructured material is being sought. Researchers often build a clean, lightweight fuel tank for hydrogen [3].

Various science-based solutions for transforming waste heat into useful energy are being investigated at Nano's machines, vehicles, houses, and power stations (Pratsinis 2016; Sabet et al. 2016). Scientists are designing solar-film solar panels that can be mounted to machine cases and lightweight piezo-electric nanowires tiled into clothing to produce on - the-job usable energy from wind, friction and/or body heat to operate mobile electronic equipment. The number and type of application of energy efficiency products are increasing. Besides the above-mentioned, they include more efficient lighting systems with considerably lower power consumption for illumination; lighter and stronger transport chassis materials; Low energy use in advanced electronics; low-friction nanomastic lubricants for all sorts of computer machinery with a higher efficiency, pumps and fans; high-light strength and fast recharge lanterns for emergency crews for smart glass coatings complementing alternate heating/cooling equipment.

Besides light vehicles and less fuel-efficient machines and alternative fuels and energy sources, there are many environmental uses in the field of nanotechnology such as technologies for sensing and removing toxic pollutants from polluted water sources in both broad and mobile applications. Nanotechnology may help address the needs of safe clean drinking water by easily identifying and purging impurities at a low cost (Rabbani et al., 2016; Sobolev and Shah, 2015; Mishra et al., 2012). Nanoparticles can one day be used to clean groundwater industrial water contaminants through chemical reactions that render them harmless, far cheaper than methods which need to inject water from the ground for treatment [4]. Nanotechnology has an enormous potential to revolutionize a broad variety of instruments and processes in health and biotechnology and enhance their personalization, usability, cost efficiency, reliability and ease of administration. Some examples of significant progress

in this area are presented below. Early diagnosis of atherosclerosis or plaque forming in arteries was accompanied by nanotechnology. Scientists also developed an imaging technology to measure the amount of a precisely packaged antibody nanopart array.

Fig 1. Nanotechnology

SENSORS AND MEDICINE APPLICATION

Early-detection, molecular imaging in which responsive biosensors constructed from nanoscale materials (e.g. nano-cantilevers, nanowires or nano channels) will recognize and record genetic and molecular occurrences, thus enabling variation molecular signals correlated with malignancy [5]. Multifunctional therapy in which a nanoparticle provides a platform for its precise treatment of cancer cells and for the delivery of effective medication, minimizing the risk of normal tissue.

Analysis facilitators such as microfluidic chip powered Nano laboratories, which can control and modify single cells and nano-scale samples to trace cell and molecular motions as they travel through their circles. Health, wellness and nano-bio-systems. A wide range of medical treatments and procedures were revolutionized in nanotechnology, to make them more customized, compact, simpler, healthier and easier to administer. Some examples of important advancement in these fields are given below (George, 2015, Ng et al., 2015; Weiss, 2015; Yashveer et al., 2014; Schulte et al., 2014; Boisseau et Loubaton, 2011). Semiconducting nanocrystals are quantum dots which can boost biological imaging in medical diagnosis. When illuminated with ultraviolet light they provide the ability to locate specific cell types and biological processes through a wide range of bright colours [6]. Such crystals offer up to 1000-fold optically better knowledge than conventional dyes in various biological experiments, including MRIs. Technology enables microfluid chip-based nano-labs to control and modify individual cells and nano-scale sensors to detect cell and molecular motions while they are in their habitat. Nanotechnology is being studied to facilitate the growth, for instance in injured spinal cord or brain cells, of nerve cells [7]. A nanostructured gel fills the gap among established cells by one approach and promotes the development of new cells.

FUTURE TRANSPORTATION APPLICATIONS

Nano engineering of and their recycled type of stainless steel, concrete, asphalt or other cement materials offers a great promise in terms of improving highway and transport infrastructure components ' efficiency, reliability and durability and reduction of cost [8]. Innovative capabilities can be integrated in conventional network technologies such as energy generation or delivery in new systems. Sensors and sensors of a nano-scale can provide cost-efficient continuous structural control of bridges, roads, trains, parking structures and flooring over time.

Fig 2. Introduction to Nanotechnology

NANOTECHNOLOGY FOR ENVIRONMENTAL PROTECTION

Highly toxic organic compounds have in recent decades been synthesized and introduced to the atmosphere to be used over a long period of time directly or indirectly. Pesticides, pesticides, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) are some of these components (Jones, 2007). In contrast with organic substances which can be quickly deteriorated by addition to the environment, certain mixed chemical compounds actively resist biodegradation by native flora [9]. Hazardous chemical compounds have therefore been one of the worst problems in today's world [10]. Environmentally important concern is the treatment of polluted land and ground water. The accumulation of soil, air and ground waters of a high concentration of a wide variety of toxins impacts the wellbeing of millions in the world (Pereira et al., 2003).

Present clean-up methods are commercially and dramatically inadequate to meet the clean-up requirements of the day [11–13]. Many experiments have shown that mixing nanoparticles with conventional treatment will improve the efficiency of removal of pollutants such as organic matter. In Zhang‟s report (Rickerby and Morrison, 2007), nano scale iron particles are very effective for the transformation and detoxification of a wide variety of common environmental contaminants, such as chlorinated organic solvents, organochlorine pesticides, and PCBs [14–17]. For a longer period of time, nanoparticles stay resistant against soil and water contaminants and in situ rapid reactions have been reported with a decrease in TCE to 99 per cent in the few days following injection of nanoparticles [18]. Several researchers have shown that nanoparticles like TiO2 have been developed and ZNo

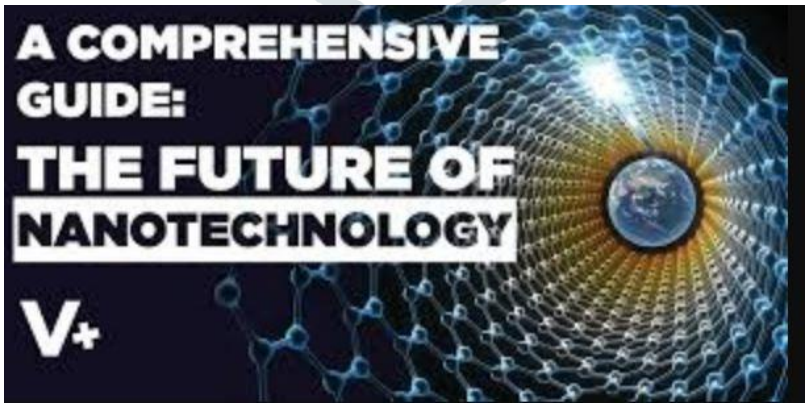

Fig 3. The Future of nanotechnology

CONCLUSION

Nanotechnology is the science of the smallest particles. Nanotechnology is a world in which new products are developed at the atomic and molecular level. It limits renewable energy sources and provides a realistic and cost-effective means of keeping the environment clean. Today, many scientists

and engineers are using nanotechnology to find new ways to improve the world. Nanotechnology has many uses, including electronics, biology, chemical engineering, and robotics. With the help of nanotechnology, doctors detect diseases early and treat diseases such as heart disease, cancer and diabetes with more effective and safer drugs. Researchers are also introducing new technologies to protect civilians and military units from conventional and chemical weapons. While many research challenges remain, nanotechnology is already producing a wide range of useful materials and mark developments in various fields. This opened up scientific research into nanoparticles and opened up new opportunities in the world.

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