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FUTURE RESEARCH OF NANOTECHNOLOGY

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Abstract— **Within the next few decades, and perhaps sooner, a new type of manufacturing will be made possible by nanotechnology. Considering its enormous potential for profound economic, environmental, social, and military impacts, Nanotechnology has received insufficient attention in ethical and policy discussions. It covers the fundamental theory: insights that may be counter intuitive or unobvious and need explanation, but that can be double-checked by simple thought. It also addresses technological capabilities of possible molecular manufacturing technologies. The development of the first self-contained molecular manufacturing system (which will then be able to produce duplicates at an exponential rate), including schedule considerations. The overall objective is to acquire a preliminary but comprehensive understanding of all significant issues related to nanotechnology, in preparation for its possible development within the next ten years.**

Index Terms— **environmental risk, oversight challenges, nanomaterials, nanoscales.**

I. Introduction

The perfection and sophistication with which scientists are learning to engineer matter at the nanometer scale is giving us unprecedented mastery of a large part of our environment. The future technology will be defined by the way we use this mastery. Since this technology was neglected from many years, the capability of safety regulatory got detreated to a greater extent. The focus of regulatory reform in this period has mostly been on how to get around the existing regulatory structure rather than on how get the improvement in it. It was designed to deal with the technologies of the industrial age. As the new technologies advance the gap between capabilities of the regulatory system and the characteristics of what some are calling the next industrial revolution got widened. Nanotechnology involves working at the scale of single atoms and molecules. The U.S. government defines nanotechnology as “the way discoveries made at the nanoscale are put to work”. The nanoscale is roughly 1–100 nanometers. For comparison, the paper on which this is printed is more than 100,000 nanometers thick. There are 25.4 million nanometers in an inch and 10 million nanometers in a centimeter. Nanoscale materials often behave differently than materials with a larger structure do, even when the basic material (e.g., silver or carbon) is the same. Converting a normal material to Nanomaterials can have different chemical, physical, electrical and biological characteristics. For example, an aluminum which is perfectly safe when changed to Nano-sized aluminum can be highly explosive and can be used to make bombs.

The best characteristics of nanomaterials mean the health and environmental risk factors will get reduced by using the products of nanotechnology, rather then using the ordinary materials. While there are no documented cases of harm attributable specifically to a nanomaterial, a growing body of evidence points to the potential for unusual health and environmental risks. This is not surprising. Nanometer-scale particles can get to places in the environment and the human body that are inaccessible to larger particles, and as a consequence, unusual and unexpected exposures can occur. Nanomaterials have a much larger ratio of surface area to mass than ordinary materials do. It is at the surface of materials that biological and chemical reactions take place, and so we would expect nanomaterials to be more reactive than bulk materials. Novel exposure routes and greater reactivity can be useful attributes, but they also mean greater potential for health and environmental risk .Oversight consists of obtaining risk information and acting on it to prevent health and environmental damage. Sufficient oversight of nanotechnology is require to promote the development of this technology. The Western countries namely The United States of America and Europe have learned that oversight and regulatory framework are necessary for the proper Functioning of markets and for large-scale acceptance of new technologies. Analysis shows that the application of current oversight systems to current forms of nanotechnology for both the United States and Europe are largely inadequate. This paper looks at future generations of nanotechnology and find that they will present even greater oversight challenges than the current technology. A new system is required to handle this technology the paper starts with an examination of the future of nanotechnology. It then analyzes the capacity of current oversight policies and authorities to deal with the anticipated technological developments. In conclusion the existing systems are grossly in adequate and a major part of this paper is devoted to thinking about a more adequate oversight system for new technologies in general and for nanotechnology In particular. Failure to think about new systems of oversight perpetuates the inadequacies and, in the long run, leads to negative effects that could undermine the promise of the new sunrise technologies.

II. THE FUTURE OF NANOTECHNOLOGY:

Predicting the future of any major technology is not an easy task. On one side, there is a tendency to underestimate the impact of a technology and the rate of its development. Nanotechnology development already is outpacing the predictions made when the NNI (National Nanotechnology Initiative) was created in 2000. At that time, the focus was on the impact Nano might have in 20–30years (Rocco 2007). Now, the analysis firm Lux Research predicts that by 2015 Nano will be incorporated in $3.1 trillion of manufactured goods worldwide (Lux Research 2008) and will account for 11 percent of manufacturing jobs globally (Lux Research 2006). Alternatively, the promise of a technology and the pace of its development may be exaggerated. There are many examples of new technologies that were predicted to be revolutionary but that had not materialized in decades, or couple of decades and more. A further complication is that a technology can develop in completely unanticipated directions and be applied in ways that no one envisaged. This section begins by reviewing several analyses of nanotechnology's future and of current Nanotechnology research. It then reviews applications of the research that are likely to occur in the next decade. It concludes by refining the attributes that are likely to characterize future technologies in general and the next generation of nanotechnology specifically.

III. NANOTECHNOLOGY RESEARCH AND DEVELOPMENT

Based on work in his Rice University laboratory James tour categorizes nanotechnologies as passive, active or hybrid i.e., technologies that are intermediate between active and passive. According to tour to commercialize each of these types it will take around five years for passive nanotechnologies, fifty years or more for active nanotechnologies and twelve years for hybrids. According to Tour, almost all the current applications of Nano are passive, and most involve adding a nanomaterial to an ordinary material as a way of improving performance. For example, he notes that adding carbon nanotubes to rubber can greatly increase the toughness of the rubber without reducing its flexibility. Passive nanotechnology applications include using materials like carbon nanotubes, silver nanoparticles and porous nanomaterials—materials containing holes that are nanometers in diameter. Tour defines an active nanotechnology as one where "the Nano entity does something elaborate." He gives the example of a "Nano car," a unique Nano-engineered molecule that can be enabled to physically move atoms from one place to another.

IV. CARBON NANOTUBES--A SUPER-ADHESIVE.

Advanced nanotechnology is making scientist to develop sophisticated new materials that can be used in various ways. For instance, researchers have created a gecko-inspired adhesive with ten times the stickiness of a gecko's foot, by combining vertically aligned nanotubes with curly not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation. Spaghetti-like nanotubes have a much stronger adhesion force parallel to The surface they are on than that perpendicular to the surface. The result is a material that can be used to attach a heavy weight to a vertical surface, and yet be peeled off with ease.And just as a gecko is able to walk up vertical surfaces with ease, the material opens up the possibility of creating clothing that will enable humans to achieve the same feat.

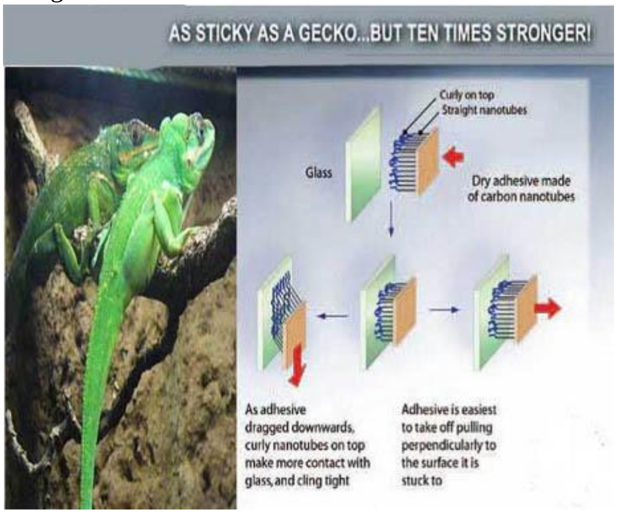

Fig a: Researchers have created a gecko-inspired adhesive with ten times the stickiness of a gecko's foot.

V. MILITARY APPLICATIONS.

The U.S. Army and the Massachusetts Institute of Technology are working on a large scale program to use design a new battle suit for soldiers using nanotechnology. They are trying to create a "bullet-resistant jumpsuit which can be light and can ease injuries, communicates automatically and can react instantly to chemical and biological agents.

VI. APPLICATIONS OF CURRENT RESEARCH

Future nanotechnologies will affect almost all the area of human activity. Medicine ,food, clothing, defense, national security, environmental clean-up, energy generation, electronics, computing and construction are some of the few leading sectors that will be changed by nanotechnology innovations. Here is a small sampling of research likely to result in practical applications within the next 15 years: Smart drugs—cancer treatments. A good deal of research, involving a variety of different nanotechnologies, is being devoted to cancer detection and cure. One of the main goals of using nanotechnology for medical purposes is to create devices that can function inside the body and serve as drug delivery systems with specific targets. Current treatments for cancer using radiation and chemotherapy are painful and produce debilitating side effects. Such treatments can kill both cancerous and healthy cells. Nanotechnology has the potential to treat various forms of cancer by targeting only the cancer cells. Researchers at Rice University have developed a technique utilizing heat and nanoparticles to kill cancer cells. Gold-coated nanoparticles designed to accumulate around cancer cells are injected into the body. Sources of radiation, similar to radio waves, are then used to transmit a narrow range of electromagnetic frequencies that are tuned to interact with the gold nanoparticles. The particles are heated by the radiation and can kill the cancer cell without heating the surrounding non-cancerous cells.

VII. CONCLUSION

Scientists and engineers often look to nature to solve complex problems or to develop technologies that have the capability of mimicking nature. The best characteristics of nanomaterials mean the health and environmental risk factors will get reduced by using the products of nanotechnology. Future nanotechnologies will affect almost all the area of human activity. Medicine ,food, clothing, defense, national security, environmental clean-up, energy generation, electronics, computing and construction are some of the few leading sectors that will be changed by nanotechnology innovations.

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