DOWNLOAD PDF 8. NANOTECHNOLOGY-PALEOCLIMATOLOGY

Chapter 1 : The nanotechnology in your clothes | Holly Cave | Science | The Guardian

The nanotechnology pros and cons show a lot of exciting potential, but that potential comes at a certain risk. Are all humans essentially good? Or is the risk of weaponizing nanotech something that could hold this technology back?

They are in charge of establishing national research policies. The government first set its sights on moving from a resource-based economy to one based on knowledge in its year development plan, Vision , adopted in This transition became a priority after international sanctions were progressively hardened from onwards and the oil embargo tightened its grip. This led to the adoption of incentive measures to raise the number of university students and academics, on the one hand, and to stimulate problem-solving and industrial research, on the other. It also made provision for research and technology centres to be set up on campus and for universities to develop linkages with industry. According to Article 15 of the Fifth Five-Year Economic Development Plan, university programmes in the humanities were to teach the virtues of critical thinking, theorization and multidisciplinary studies. A number of research centres were also to be developed in the humanities. In , spending stood at 0. It lays particular stress on developing university research and fostering universityâ€"industry ties to promote the commercialization of research results. After peaking at this level, higher education spending stood at 0. Higher education spending has resisted better than public expenditure on education overall. The latter peaked at 4. Women in Iran Students enrolled in Iranian universities, and Between and , student rolls swelled from 2. The most popular in were social sciences 1. Women also made up two-thirds of medical students. This is comparable to the ratio in the Republic of Korea and Thailand one in seven and Japan one in ten. Natural sciences and engineering have proved increasingly popular among both sexes, even if engineering remains a male-dominated field. Although data are not readily available on the number of PhD graduates choosing to stay on as faculty, the relatively modest level of domestic research spending would suggest that academic research suffers from inadequate funding. By , there were about 14 foreign students attending Iranian universities, most of whom came from Afghanistan, Iraq, Pakistan, Syria and Turkey. In a speech delivered at the University of Tehran in October , President Rouhani recommended greater interaction with the outside world. In , one in seven international students in Malaysia was of Iranian origin. There is a lot of scope for the development of twinning between universities for teaching and research, as well as for student exchanges. This corresponds to an increase of more than 2 researchers, from 52 to 54 The world average is 1 per million inhabitants. In , half of researchers were employed in academia The number of firms declaring research activities more than doubled between and , from 30 to 64 The increasingly tough sanctions regime oriented the Iranian economy towards the domestic market and, by erecting barriers to foreign imports, encouraged knowledge-based enterprises to localize production. Expenditure peaked at 0. Foreign direct investment in Iran and Economy of Iran Trends in Iranian scientific publications, â€" It was intended for one-third of this amount to come from abroad but, so far, FDI has remained elusive. A law passed in provides an appropriate mechanism, the Innovation and Prosperity Fund. Public and private universities wishing to set up private firms may also apply to the fund. IDRO has set up special purpose companies in each high-tech sector to coordinate investment and business development. In , IDRO set up a capital fund to finance the intermediary stages of product- and technology-based business development within these companies. Technology start-ups in Iran , Industry of Iran , Foreign Direct Investment in Iran , and List of research parks As of , Iran had officially 31 science and technology parks nationwide. Fars Province , with 8 parks and Razavi Khorasan Province , with 7 parks, are ranked second and third after Tehran respectively.

Chapter 2 : Nanotechnology - Wikipedia

Paleoclimatology data are derived from a wide variety of natural sources such as tree rings, ice cores, corals, and ocean and lake sediments. Paleoclimatology data are derived from natural sources such as tree rings, ice cores, corals, and ocean and lake sediments.

These micro-machines have the ability to change several industries all at the same time. Combining all aspects of a STEM education, there is even the chance that nanotechnologies could be the cure for severe diseases and genetic disorders. As with any new technology, the benefits that nanotechnology can bring are very exciting. There are also disadvantages that must be carefully evaluated. The Pros of Nanotechnology 1. It creates change on the cellular level. Nanotechnology has the potential of restructuring items at a cellular level. Imagine turning organic cells instantly into consumable food, just like the Star Trek replicator does. Trash could be turned into usable goods. Recycling would take on a whole new meaning. It could extend human life. Because cells can be altered at their core level, there are a number of ways that human life could be extended. Difficult diseases such as cancer or ALS could be cured. The aging process could be slowed down or potentially even stopped. Organic materials could be manipulated to create or repair damaged organs or even replace amputated limbs. Only our imagination could limit the effectiveness of this technology in this area. It could create self-repairing technology. Imagine being on an airplane that has a malfunction in its hydraulics system. Once the malfunction is detected, the nanotechnology could be started to fix the problem so the aircraft and its passengers can be saved. In many ways, nanotechnology could even eliminate poverty. The Cons of Nanotechnology 1. It could be easily weaponized. Nanotechnology is only as good as the programmer behind it. If cellular repair can happen, then so can cellular destruction. Weaponized nanotechnologies could lead to programmed delivery systems that could eliminate a population while living an urban infrastructure completely intact. They may cause their own unique diseases. There are already reported incidents of disease development in individuals who have inhaled nanoparticles. It could create a new system of class identity. If nanotechnologies do wind up providing low-cost food and health options, there is always the possibility that one nation or group would hoard this technology to themselves. One socioeconomic class could keep the technology for their own benefit, creating a new system of haves and have nots. It could make current energy technologies obsolete. Numerous sectors of industries today are built on fossil fuels. Nanotech could make these technologies obsolete. The resulting change in economic circumstances would shift where the value is seen in a population base. It would also create a new economic classification because any product could be created, including gold and other valuable resources. The shift could be devastating to households invested in these items. The nanotechnology pros and cons show a lot of exciting potential, but that potential comes at a certain risk. Are all humans essentially good? Or is the risk of weaponizing nanotech something that could hold this technology back? We must weigh these pros and cons carefully to determine our next steps in this exciting STEM field of research.

Chapter 3 : blog.quintoapp.com - climate

Programme Description PROBIST is a post-doctoral fellowship Programme led by the Barcelona Institute of Science and Technology. Altogether, 61 fellowships will be awarded and implemented in top research in the Barcelona and Tarragona area (Spain).

The term "nano-technology" was first used by Norio Taniguchi in , though it was not widely known. Eric Drexler used the term "nanotechnology" in his book Engines of Creation: The Coming Era of Nanotechnology , which proposed the idea of a nanoscale "assembler" which would be able to build a copy of itself and of other items of arbitrary complexity with atomic control. Also in , Drexler co-founded The Foresight Institute with which he is no longer affiliated to help increase public awareness and understanding of nanotechnology concepts and implications. Since the popularity spike in the s, most of nanotechnology has involved investigation of several approaches to making mechanical devices out of a small number of atoms. First, the invention of the scanning tunneling microscope in which provided unprecedented visualization of individual atoms and bonds, and was successfully used to manipulate individual atoms in Buckminsterfullerene C60, also known as the buckyball , is a representative member of the carbon structures known as fullerenes. Members of the fullerene family are a major subject of research falling under the nanotechnology umbrella. In the early s, the field garnered increased scientific, political, and commercial attention that led to both controversy and progress. These products are limited to bulk applications of nanomaterials and do not involve atomic control of matter. Some examples include the Silver Nano platform for using silver nanoparticles as an antibacterial agent, nanoparticle -based transparent sunscreens, carbon fiber strengthening using silica nanoparticles, and carbon nanotubes for stain-resistant textiles. By the mids new and serious scientific attention began to flourish. Projects emerged to produce nanotechnology roadmaps [19] [20] which center on atomically precise manipulation of matter and discuss existing and projected capabilities, goals, and applications. Fundamental concepts Nanotechnology is the engineering of functional systems at the molecular scale. This covers both current work and concepts that are more advanced. In its original sense, nanotechnology refers to the projected ability to construct items from the bottom up, using techniques and tools being developed today to make complete, high performance products. By comparison, typical carbon-carbon bond lengths , or the spacing between these atoms in a molecule , are in the range 0. By convention, nanotechnology is taken as the scale range 1 to nm following the definition used by the National Nanotechnology Initiative in the US. The lower limit is set by the size of atoms hydrogen has the smallest atoms, which are approximately a quarter of a nm kinetic diameter since nanotechnology must build its devices from atoms and molecules. The upper limit is more or less arbitrary but is around the size below which phenomena not observed in larger structures start to become apparent and can be made use of in the nano device. In the "bottom-up" approach, materials and devices are built from molecular components which assemble themselves chemically by principles of molecular recognition. The positions of the individual atoms composing the surface are visible. Nanomaterials Several phenomena become pronounced as the size of the system decreases. These include statistical mechanical effects, as well as quantum mechanical effects, for example the " quantum size effect" where the electronic properties of solids are altered with great reductions in particle size. This effect does not come into play by going from macro to micro dimensions. However, quantum effects can become significant when the nanometer size range is reached, typically at distances of nanometers or less, the so-called quantum realm. Additionally, a number of physical mechanical, electrical, optical, etc. One example is the increase in surface area to volume ratio altering mechanical, thermal and catalytic properties of materials. Diffusion and reactions at nanoscale, nanostructures materials and nanodevices with fast ion transport are generally referred to nanoionics. Mechanical properties of nanosystems are of interest in the nanomechanics research. The catalytic activity of nanomaterials also opens potential risks in their interaction with biomaterials. Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications. For instance, opaque substances can become transparent copper ; stable materials can turn combustible aluminium ; insoluble materials may become soluble gold. A material such as gold, which is chemically inert at normal scales, can serve as a potent chemical catalyst at nanoscales. Much of the fascination with nanotechnology stems from these quantum and surface phenomena that matter exhibits at the nanoscale. Molecular self-assembly Modern synthetic chemistry has reached the point where it is possible to prepare small molecules to almost any structure. These methods are used today to manufacture a wide variety of useful chemicals such as pharmaceuticals or commercial polymers. This ability raises the question of extending this kind of control to the next-larger level, seeking methods to assemble these single molecules into supramolecular assemblies consisting of many molecules arranged in a well defined manner. The concept of molecular recognition is especially important: The Watsonâ€"Crick basepairing rules are a direct result of this, as is the specificity of an enzyme being targeted to a single substrate , or the specific folding of the protein itself. Thus, two or more components can be designed to be complementary and mutually attractive so that they make a more complex and useful whole. Such bottom-up approaches should be capable of producing devices in parallel and be much cheaper than top-down methods, but could potentially be overwhelmed as the size and complexity of the desired assembly increases. Most useful structures require complex and thermodynamically unlikely arrangements of atoms. Nevertheless, there are many examples of self-assembly based on molecular recognition in biology , most notably Watsonâ€"Crick basepairing and enzyme-substrate interactions. The challenge for nanotechnology is whether these principles can be used to engineer new constructs in addition to natural ones. Molecular nanotechnology Molecular nanotechnology, sometimes called molecular manufacturing, describes engineered nanosystems nanoscale machines operating on the molecular scale. Molecular nanotechnology is especially associated with the molecular assembler , a machine that can produce a desired structure or device atom-by-atom using the principles of mechanosynthesis. Manufacturing in the context of productive nanosystems is not related to, and should be clearly distinguished from, the conventional technologies used to manufacture nanomaterials such as carbon nanotubes and nanoparticles. When the term "nanotechnology" was independently coined and popularized by Eric Drexler who at the time was unaware of an earlier usage by Norio Taniguchi it referred to a future manufacturing technology based on molecular machine systems. The premise was that molecular scale biological analogies of traditional machine components demonstrated molecular machines were possible: It is hoped that developments in nanotechnology will make possible their construction by some other means, perhaps using biomimetic principles. However, Drexler and other researchers [27] have proposed that advanced nanotechnology, although perhaps initially implemented by biomimetic means, ultimately could be based on mechanical engineering principles, namely, a manufacturing technology based on the mechanical functionality of these components such as gears, bearings, motors, and structural members that would enable programmable, positional assembly to atomic specification. In general it is very difficult to assemble devices on the atomic scale, as one has to position atoms on other atoms of comparable size and stickiness. Another view, put forth by Carlo Montemagno, [29] is that future nanosystems will be hybrids of silicon technology and biological molecular machines. Richard Smalley argued that mechanosynthesis are impossible due to the difficulties in mechanically manipulating individual molecules. Leaders in research on non-biological molecular machines are Dr. An experiment indicating that positional molecular assembly is possible was performed by Ho and Lee at Cornell University in They used a scanning tunneling microscope to move an individual carbon monoxide molecule CO to an individual iron atom Fe sitting on a flat silver crystal, and chemically bound the CO to the Fe by applying a voltage. Current research Graphical representation of a rotaxane , useful as a molecular switch. This DNA tetrahedron [33] is an artificially designed nanostructure of the type made in the field of DNA nanotechnology. Each edge of the tetrahedron is a 20 base pair DNA double helix , and each vertex is a three-arm junction. Rotating view of C60, one kind of fullerene. This device transfers energy from nano-thin layers of quantum wells to nanocrystals above them, causing the nanocrystals to emit visible light. Nanomaterials with fast ion transport are related also to nanoionics and nanoelectronics. Nanoscale materials can also be used for bulk applications; most present commercial applications of nanotechnology are of this flavor. Progress has been made in using these materials for medical applications; see Nanomedicine. Nanoscale materials such as nanopillars are sometimes used in solar cells which combats the cost of traditional silicon solar cells. Development of applications incorporating semiconductor nanoparticles to be used in the next generation of products, such as display technology, lighting, solar cells and biological imaging; see quantum dots. Recent application of nanomaterials include a range of biomedical applications, such as tissue engineering , drug delivery , and biosensors. DNA nanotechnology utilizes the specificity of Watsonâ€”Crick basepairing to construct well-defined structures out of DNA and other nucleic acids. Approaches from the field of "classical" chemical synthesis Inorganic and organic synthesis also aim at designing molecules with well-defined shape e. More generally, molecular self-assembly seeks to use concepts of supramolecular chemistry, and molecular recognition in particular, to cause single-molecule components to automatically arrange themselves into some useful conformation. Atomic force microscope tips can be used as a nanoscale "write head" to deposit a chemical upon a surface in a desired pattern in a process called dip pen nanolithography. This technique fits into the larger subfield of nanolithography. Molecular Beam Epitaxy allows for bottom up assemblies of materials, most notably semiconductor materials commonly used in chip and computing applications, stacks, gating, and nanowire lasers. Top-down approaches These seek to create smaller devices by using larger ones to direct their assembly. Giant magnetoresistance -based hard drives already on the market fit this description, [41] as do atomic layer deposition ALD techniques. Focused ion beams can directly remove material, or even deposit material when suitable precursor gasses are applied at the same time. Atomic force microscope tips can be used as a nanoscale "write head" to deposit a resist, which is then followed by an etching process to remove material in a top-down method. Functional approaches These seek to develop components of a desired functionality without regard to how they might be assembled. Magnetic assembly for the synthesis of anisotropic superparamagnetic materials such as recently presented magnetic nano chains. These could then be used as single-molecule components in a nanoelectronic device. Synthetic chemical methods can also be used to create synthetic molecular motors , such as in a so-called nanocar. Biomimetic approaches Bionics or biomimicry seeks to apply biological methods and systems found in nature, to the study and design of engineering systems and modern technology. Biomineralization is one example of the systems studied. Bionanotechnology is the use of biomolecules for applications in nanotechnology, including use of viruses and lipid assemblies. Speculative These subfields seek to anticipate what inventions nanotechnology might yield, or attempt to propose an agenda along which inquiry might progress. These often take a big-picture view of nanotechnology, with more emphasis on its societal implications than the details of how such inventions could actually be created. Molecular nanotechnology is a proposed approach which involves manipulating single molecules in finely controlled, deterministic ways. This is more theoretical than the other subfields, and many of its proposed techniques are beyond current capabilities. Nanorobotics centers on self-sufficient machines of some functionality operating at the nanoscale. There are hopes for applying nanorobots in medicine, [46] [47] [48] but it may not be easy to do such a thing because of several drawbacks of such devices. Because of the discrete i. Due to the popularity and media exposure of the term nanotechnology, the words picotechnology and femtotechnology have been coined in analogy to it, although these are only used rarely and informally. The dimensionality play a major role in determining the characteristic of nanomaterials including physical , chemical and biological characteristics. With the decrease in dimensionality, an increase in surface-to-volume ratio is observed. This indicate that smaller dimensional nanomaterials have higher surface area compared to 3D nanomaterials. Recently, two dimensional 2D nanomaterials are extensively investigated for electronic , biomedical , drug delivery and biosensor applications. Tools and techniques Typical AFM setup.

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Chapter 5 : Science and technology in Iran - Wikipedia

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According to a Lux Research estimate released in December , "The U.S. leads in government (state and Federal) nanotechnology funding with $ billion spent in and $ billion spent in Europe's collective spending (European Commission and individual country programs) was $ billion in , an increase of % from

Chapter 6 : 53 Nanotechnology jobs - Academic Positions

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