Pervasive Computing with Nanotechnological Aspects

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Abstract- *With the express improvement of nanoscience and nanotechnology in multidisciplinary fields, nanomaterials have fascinated broad fields of applied science and technology. With the learning of nanosize particles, devices and composites, it is promising to discover customs to build stronger materials, detect diseases in bloodstream, manufacture extremely tiny machines, generate light and energy and purify the water. In this paper, initially we have discussed about synthesis and properties of nanoparticles. Further we have focused on the shrinking computers by Nanotechnology in pervasive computing.*

Keywords- Nanotechnology, Nanomaterials, Pervasive computing, VLSI, OS.

I. INTRODUCTION

Michel faraday synthesized steady gold colloidal particles of nanosize in 1857AD which shows magneta red colour solution. Decorative glass window through attractive design in aged churches and palace indeed use of nanoparticles of iron, cobalt, nickel, gold, silver etc. Photographic plates have nanoparticles. The first explanation and size measurements of nanoparticles were made at some stage in first decade of 20th century. They are classically associated with Richard Adolf Z sigmondy who ended detail study of gold solutions and other nanomaterials with sizes down to 10 nm and less. He used ultra microscope that employees dark field method for seeing particles with sizes much less than light wavelength. He was also the first who used nanometer explicitly for characterizing particle size.

Properties of nanoparticles

Nanoparticles give increased ratio of surface area to volume ratio, which present in many nanoscale materials (Chang Huan et.al, 2014). Material reduced to nanoscale can suddenly show very different properties compared to what they exhibit on a microscale, enabling unique applications (Allsopp et al, 2007). For examples opaque copper becomes transparent at nanoscale, inserted platinum becomes catalysts, stable aluminum material combustible, solid gold turn into liquid at Room temperatures, gold is chemically insert but at nanoscale it serve as a potent chemical catalysts (Manas Chandra, Modern introductory Physics by Chemical bond, 1991).

Bottom up approach: These seek to arrange smaller components into more complex assemblies. For example DNA nanotechnology utilizes the specialty of Watson-crick base pairing to construct well defined structures out of DNA and other nucleic acids, designing molecules with well defined shape, more generally molecular self-assembly seeks to use concepts of supramolecular chemistry and molecular recognition in particular cause single molecular recognition in particular cause single-molecule components to automatically arrange themselves into some useful confirmation (Yogesh P. Patil et al 2016).

Top down approach: These seek to create smaller devices by using larger ones to direct their assembly. For examples fabricating microprocessors is smaller than 100nm, solid state techniques can also be used to create devices known as nanoelecromechanical systems or NEMS, AFM 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 (S. K. Kulkarni, Nanotechnology Principles and practices, 2011).

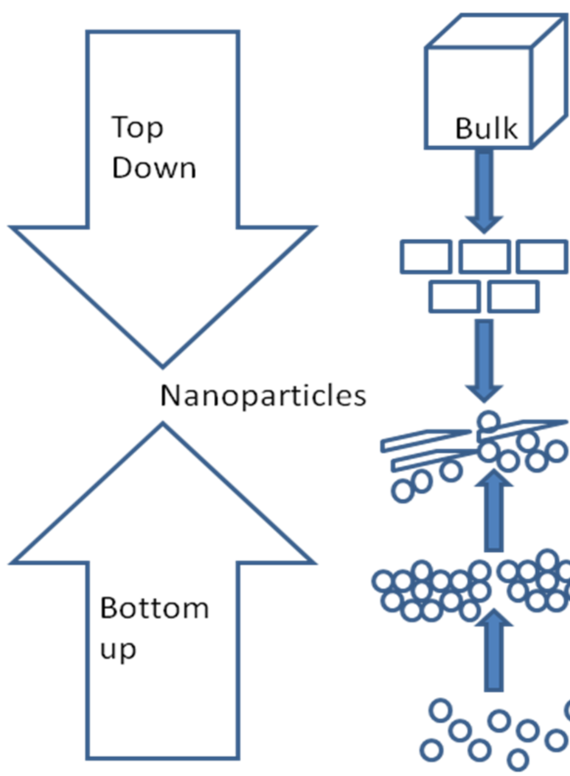

Fig. 1 Synthesis approaches

Synthesis of nanoparticles

There is a large number of techniques available synthesize different types of nanomaterials in the form of colloids, clusters, powders, tubes, rods, wires, thin film etc. Nanomaterial synthesis and processing can be done with various methods. Nanoparticles deal with very fine structures a nanometer is a billionth of a meter.

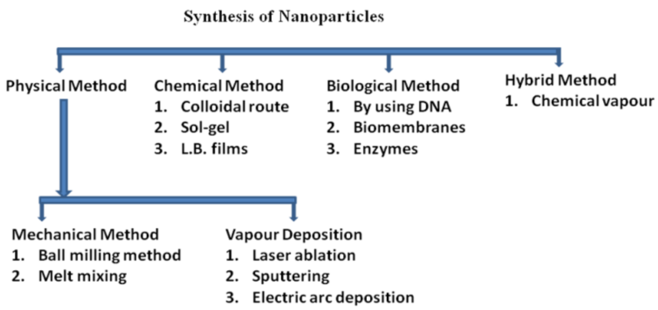

Fig. 2 Methods of synthesis

Either to assemble atoms together or to dis-assembles(break or dissociate) bulk solids into finger pieces until they are constituted of only a few atoms.

Pervasive computing

Computer science nowadays appears to be challenged by technological progress and quantitative growth. Among the technological progress challenges are advances in sub-micron and system-on-a-chip designs, novel communication technologies, micro-electro-mechanical systems, nano and material sciences. The vast pervasion of global networks over the past years, the growing availability of wireless communication technologies in the wide, local and personal area and evolving ubiquitous use of mobile and embedded information and communication technologies are examples for challenges posed by quantitative growth. We perceive shift from the “one person with one computer” paradigm which is based on explicit man machine interaction, towards a pervasive computing landscape, in which implicit interaction and co operation is the primary mode of computer supported activity. This change-popularly referred to as “Pervasive computing” poses serious challenges to the conceptual architectures of computing and the related engineering disciplines in computer science (Stefan Poslad, Ubiquitous computing, 2012).

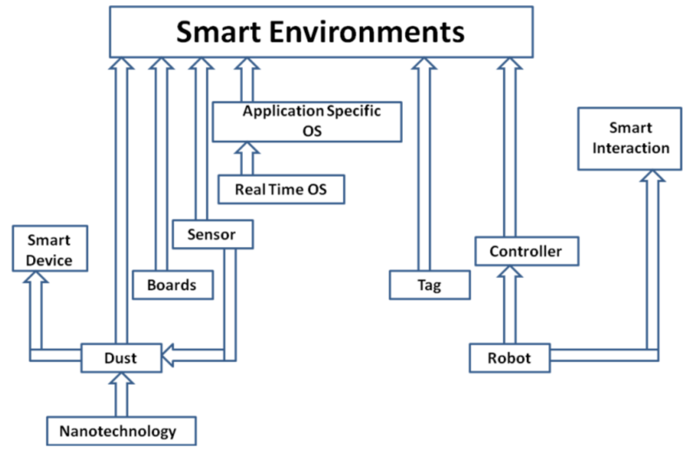

Fig.3 Component of Smart environments

Pervasive computing applications are characterized by the following basic elements:

1. Ubiquitous access
2. Context awareness
3. intelligence
4. natural interaction

Shrinking Computers by nanotechnology:

Nanotechnology helps make the ubiquitous aspect of parvasive computing possible. Size is one obstacle to put computer everywhere. You can put desktop computer on your desktop (David Geer, 2006). But you cannot put it in your blood stream. Shrinking computers makes it possible to put them almost anywhere. To focus nanotechnology’s potential, think about building things from the molecular level up. At that level, you can build in characteristics and capabilities that are not readily apparent. Projects from data storage to power generation to medical exploration are all putting nanotechnology to use.

The size of secure digital card a memory card the size of postage stamp weighing less than ounce and it will have the storage capacity of dozens of gigabits.”It is a considerable improvement in terms of capacity”. The thinnest transformer is build into the integrated circuit(IC)-a microchip wafer or a consumer electronics computer chip-whereas traditional transformers are separate components. to thinnest transformer manufactures save space and production costs, which translates into smaller, cheaper consumer electronics such as mobile phones, radios, TVs, and computers.

A nanotube is a long, round carbon structure made of graphite molecules. Nanotube electrodes improve the energy density in these batteries, affording longer battery life. Nanotechnology is springing up in nontraditional power storage, as well. Power Plastic is an example of a solar-power storage material, also referred to as plastic solar cell. Plastic solar offers several advantages over silicon solar cells. As plastic solar is made of conducting polymers therefore nano-engineered materials that can be used to coat surfaces. Creating nanostructures transistors of a much higher density with very high throughput is a growing need, Processing for pervasive devices and small distributed systems is fueling this demand.

In addition, today's computer-chip manufacturing processes aren't fault tolerant (any flaw or defect has the potential to break down the system). Nanoscale lithography techniques, on the other hand, have the potential to produce faultless or fault tolerant chips.

II. CONCLUSION

Nanoscience refers to the world as it works on the atomic or molecular scale, in nanotechnology, material is introduced with billionth smaller dimensions in order to suit distinct applications of materials. These materials have impressive properties which are advantageous for technological development. In this paper we have discussed about one of the broad application of nanoworld which is essential for smart environment as it it essential to ease human life. Component of various disciplines and technologies are bringing a range of applications of pervasive computing. To create smartness in technologies, it is necessary to nurture pervasive computing and amplification of pervasive computing cannot be achievable without evolution and implementation of nanotechnology.

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