

Nanotechnology

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Abstract:-- Nanotechnology ,when we talk about nanotechnology the first thing which came into our mind is the size and we imagine whole new different world on a Nano scale .and its really fascinating because nanotechnology is not just a technology it's a revolution because it's not just a technology which can be applied to specific area of research or specific field .it has the power to maximize all limitations which we are facing now a days in industrial ,medical ,manufacturing , electronics, and so many different fields .we are living in a digital world so as we are looking into future more and more the daily instruments goods which we use in our day to life are getting compact in size and much more comfortable to use light in weight and the quality of that product is getting better day by day. nanotechnology actually deals with materials on Nano scale its being used since last hundreds of years accidentally in the field of manufacturing. in 1980's Drexler he is the man who actually thought that and really talked about the little robots on Nano scale which can actually position atoms in precise places we can call it molecular assemblers he is the futuristic person. But now a days also most academics and researchers especially who belong to chemistry, physics and manufacturing field they all are pushing down there limits to nanometer scale. But like every technology this also has challenging factors which manufacturing researchers are facing that fabrication on the Nano scale is very much difficult to achieve because we had developed fabrication units up to micro scale .apart from this scientist have developed so many other important products ,medicines with the help of nanotechnology

Keywords— electronics ,nanotubes, history(nanotechnology)

I. INTRODUCTION

The concept of this technology 1st discussed by the most famous physicist Richard Feynman in his talk "there is plenty of room at the bottom" in 1959 he is the godfather of nanotechnology who brought this concept known to people .and the terms we use nanotechnology was first used by Japanese professor of Tokyo university of science Norio Taniguchi . there are so many definitions for nanotechnology according to different accepts .nanotechnology is the term which deals with the material size .it is fundamental understanding of nature that how it work at the atomic level scale. For example we can ask to yourself that what's the key factors which differentiate human beings from animals as we know that there were stone age where humans actually made a tools from stone they learned it.then bronze age came and they learned to smelt copper then iron age came where humans actually forge iron and steel now here is information age and we have learned to purify silicon and we are using it to make different products like mobiles computers which made our life and society more comfortable and easy and if we look back to our past then we can analyze where were we and where are we now. And this nanotechnology is actually a revolution or we can say it as a Nano age in which we are learning to make Nano scale materials.

In early 1990's people who were working or learning on nanotechnology couldn't be able to do

nanotechnology because like other technology there were no tools with which they can actually see what nanomaterial looks like its size, its properties. For example if you have given the bowl with black powder u can't say that it's a black powder because it can be something else, we can't study its molecular properties without proper tools. And in terms of nanotechnology its really hard to visualize and imagine what it is actually. Then after some time there were tools which had been created these tools actually helped the researchers to actually see the nanomaterial and there structure on nanoscale.so I can say that was really a very important and most useful period in the field of nanotechnology because people who are working on this technology found the right tools which are widely available and with the help of these tools they can control size and study how it can change the properties of material

II. GO SMALL?

If we talk about electronics industries or research sector ,let us take the example of mobile phones as shown below it's the motherboard of old mobile phone as u can see the black portions are integrated circuit and into which there are lots of transistors in micro scale. Transistors decides the capacity of phone the more the transistors the more the capacity but as we increase the transistors the size is also get bigger and bigger.



Fig No. 1



Fig No. 2

So with the help of nanotechnology we can make the size of transistors to Nano scale so we will get more surface area and we can use more transistor in small area and because of this we will get compact size and more efficient and light in weight product which is happening if we look at our past as shown in figure 2.

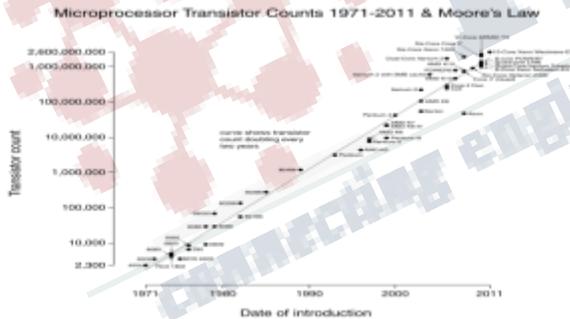


Fig No. 3(Moore's law)

Gordon E Moore who is co-founder of the Intel corporation did the observation that in the history of computing hardware the number of transistors in dense integrated circuit doubles approximately every two years this is afterword's named as "Moore's law" .his observation had been proved correct as we can see on above fig. as u can see transistors count get doubled every two years and we are getting better integrated circuits as the amount of transistors goes on increasing and technology is getting compact and compact.

III. WHAT IS 10 NANOMETER?

In the case of Nano it's ten to the minus nine. So, when you think about length, and you think about nanometers and centimeters and microns ,that's really the heart of nanometer and the one to 100 nanometer range of nanotechnology. So the question is what is the size of these things if we imagine about them in terms of Nano scale .We can understand it with the help of real world objects or things.so consider the mountain as a kilometer so if I were on a nanometer scale it will be very big. Now consider an ant is about a millimeter and fungus and different bacteria are at micron scale it's still bigger than ten nanometers, but approaching that. Cell organelles, will be at sub-micron. Proteins, turns out many small proteins are right around a couple of nanometers. And at the end molecules, the world of Glucose is ten to the minus ten meters. Forexample, let us consider the size of a bacteria or a blood cell. So in the nanometer world it places objects in between chemistry and biology. Certain viruses are in nanometer scale so it's very interesting scale to work in.

Now let us the get the clear idea about this by comparing our world to Nano world.consider if are shrinking and u are in a millimeter range the hare on your head will appear like forest And if you shrank down to the micron scale, the width of one of those human hairs would be between 40 and 80 microns so after this you really look like human hair .but you can still see because we can all see our hairs each one of them.so if you again shrank down to nanometer scale like 10 nanometer you will look like a red blood cells and u can't imagine they will look like the biggest cricket stadium in the world. And if we talk about polio virus then it will look like basketball hoop .so now you can imagine how interesting it is to imagine on this Nano scale.

IV. TODAYS NANOTECHNOLOGY

There are eight incredible nanotechnologies that exists today. We already know about 3D printers but now scientists discovered molecule printers in which output result of cad program is given to this printer and it will build the functional molecule piece by piece .the second nanotechnology exists today is stretchable gold means we saw all the circuits are stiff and hard. Now scientist invented stretchable gold that can be printed on rubber circuit's boards. Because of this we can stretch and bend circuits and it minimized the damage of hardware which happened in stiff circuit boards. The third most revolutionary research in nanotechnology is that scientist discovered an artificial muscle with the help of carbon nanotubes. The fourth discovery is in the medical science as we know the most difficult part in treating cancer patient is that doctors need to inject or give medicine in to specific

part of a body in which cancer is active so now using Nano scale drug capsule they can do this difficult procedure in a very efficient way called as highly targeted drug delivery capsules. And there are lot more research going on in the field of nanotechnology which helping us to make our lifestyle better day by day.

V CONCLUSION

The nanotechnology is playing very important role in research areas like medical science and industrial manufacturing areas and in future it will improvise our lives a way beyond our imagination and especially in medical science hopefully one day we will be able to cure all lethal deceases and save peoples lifes and in electronics industrial area we will be fabricating electronics chips on Nano scale

REFERENCES

1. <http://www.courceera.com>
2. <http://www.google.com>
3. <http://www.ioe.com>
4. <http://www.wikipedia.org>
5. Nanotechnology :importance and applications by [M. H. Fulekar](#)
6. Nanotechnology: science ,innovation and opportunity by [Lynn E. Foster](#)