Enhancing the Strength of the mobile using Nanotechnology called 'Morph'

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ABSTRACT

In business a product could have a shorter life if it can't win the hearts of people and showcase new technology, so take the case of Nokia, who is coming up with the NokiaMorph flexible mobile phone which the company claims include nanotechnology and would immensely benefit its end-users. The main benefit of Nanotechnology is that its components are flexible, transparent and extremely strong. The company believes this latest technology would be a distinctive phone by 2015, but a few technical glitches remained to be solved, like the use of new battery materials etc.Nokia morph is a joint technology concept, developed by nokia research center (NRC) and the University of Cambridge (UK). The morph demonstrate how future mobile device might be stretchable and flexible, allowing the user to transform their mibiledevices into radically different shaped.

It demonstrates the ultimately that nanotechnology might be capable of delivering: flexible material, transparent electronics and self-cleaning surface. Nanotechnology enables materials and components that are flexible, stretchable, transparent and remarkably strong. Fibril proteins are woven into three dimensional meshes that reinforce thin elastic structures. Using the same principle behind spider silk, thiselasticity enables the device to literally changes shapes and configures itself to adapt to the task at hand.

INTRODUCTION

The Morph concept:

Launched alongside The Museum of Modern Art "Design and The Elastic Mind "exhibition, the Morph concept device is a bridge between highly advanced technologies and their potential benefits to end-users. This device concept showcases some revolutionary leaps being explored by Nokia Research Center (NRC) in collaboration with the Cambridge Nan science Centre (United Kingdom) – nanoscale technologies that will potentially create a world of radically different devices that open up an entirely new spectrum of possibilities. Morph concept technologies might create fantastic opportunities for mobile devices:

•Newly-enabled flexible and transparent materials blend more seamlessly with the waywelive

•Devices become self-cleaning and self-preserving

•Transparent electronics offering an entirely new aesthetic dimension

•Built-in solar absorption might charge a device, whilst batteries become smaller, longer lasting and faster to charge

•Integrated sensors might allow us to learn more about the environment around us, empowering us to make better choices In addition to the advances above, the integrated electronics shown in the Morph concept could cost less and include more functionality in a much smaller space, even as interfaces are simplified and usability is enhanced. All of these new capabilities will unleash new applications and services that will allow us to communicate and interact in unprecedented ways

1.2 Literature Review :

Morph is a concept that demonstrates how future mobile devices might be stretchableand flexible, allowing the user to transform their mobile device into radically differentshapes. It demonstrates the ultimate functionality that nanotechnology might be capableof delivering: flexible materials, transparent electronics and self-cleaning surfaces.Thedevice, which is made using nanotechnology, is intended to demonstrate how cell phonesin the future could be stretched and bent into different shapes, allowing users to "morph"their devices into whatever shape they want. Want to wear your cell phone as a bracelet?No problem, just bend it around your wrist

Even though Morph is still in early development, Nokia believes that certain elementsof the device could be used in high-end Nokia devices within the next seven years. Andas the technology matures, nanotechnology could eventually be incorporated into Nokia'sentire line of products to help lower manufacturing costs. Nokia Morph is truly anabsolutely wonderful gadget with flexible bending and wearing options and surely thebest in the gadgets segment from the house of Nokia

1.2.1 What is Nanotechnology?

A basic definition:

Nanotechnology is the engineering of functional systems at themolecular 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.Nanotechnology may one day lead to low cost manufacturing solutions, and offersthe possibility of integrating complex functionality at a low price. Nanotechnology alsocan be leveraged to create self-cleaning surfaces on mobile devices, ultimately reducingcorrosion, wear and improving longevity. Nanostructured surfaces, such as"Nanoflowers" naturally repel water, dirt, and even fingerprints utilizing effects also seenin natural systems.Elegant three-dimensional MoS

1.2.2 Molecular nanotechnology:

Molecular nanotechnology, sometimes called molecular manufacturing, describesengineered nanosystems (nanoscale machines) operating on the molecular scale.Molecular nanotechnology is especially associated with the molecular assembler, amachine that can produce a desired structure or device atom-by-atom using the principlesof mechanosynthesis. Manufacturing in the context of productive nanosystems is notrelated to, and should be clearly distinguished from, the conventional technologies usedto manufacture nanomaterials such as carbon nanotubes and nanoparticles.When the term "nanotechnology" was independently coined and popularized by EricDrexler (who at the time was unaware of an earlier usage by Norio Taniguchi) it referredto a future manufacturing technology based on molecular machine systems. The premisewas that molecular scale biological analogies of traditional machine componentsdemonstrated molecular machines were possible: by the countless examples found inbiology, it is known that sophisticated, stochastically optimised biological machines canbe produced..It is hoped that developments in nanotechnology will make possible their construction bysome other means, perhaps using biomimetic principles. However, Drexler and other researchers[6] have proposed that advanced nanotechnology, although perhaps initiallyimplemented by biomimetic means, ultimately could be based on mechanical engineeringprinciples, 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.[7]

1.2.3 Nokia Research Center

Nokia believes that effective research and development is vital to remaining competitivein the mobile computing and communications industry. As of April 1, 2007, we had R&Dcenters in 11 countries and employed 14,500 people in research and development,representing approximately 32% of Nokia's total workforce. R&D expenses totaled EUR3,9 billion in 2006, representing 9,5% of Nokia's net sales. We invest a substantialportion of our resources in research and development activities within our principalbusiness groups Mobile Phones, Multimedia and Enterprise Solutions, TechnologyPlatforms , and in

the Nokia Research Center (NRC).Nokia Research Center has a unique mission to lead Nokia into the future: NRC will bethe global leader of open innovation for human mobility systems of the fused physicaland digital world, giving birth to the growth of businesses for Nokia.

2.1 CONCEPT OF NOKIA MORPH

Morph is a concept that demonstrates how future mobile devices might be stretchable andflexible, allowing the user to transform their mobile device into radically different shapes.It demonstrates the ultimate functionality that nanotechnology might be capable of delivering: flexible materials, transparent electronics and self-cleaning surfaces. Dr. BobIannucci, Chief Technology Officer, Nokia, commented: "Nokia Research Center islooking at ways to reinvent the form and function of mobile devices; the Morph conceptshows what might be possible".Professor Mark Welland, Head of the Department of Engineering's Nanoscience Group atthe University of Cambridge and University Director of Nokia-Cambridge collaborationadded: "Developing the Morph concept with Nokia has provided us with a focus that isboth artistically inspirational but, more importantly, sets the technology agenda for our joint nanoscience research that will stimulate our future work together. 2.2

2.2 APLLIED TECHNOLOGY USEDNANOTECHNOLOGY

Nanotechnology may one day lead to low cost manufacturing solutions, and offersthe possibility of integrating complex functionality at a low price. Nanotechnology alsocan be leveraged to create self-cleaning surfaces on mobile devices, ultimately reducingcorrosion, wear and improving longevity. Nanostructured surfaces, such as"Nanoflowers" naturally repel water, dirt, and even fingerprints utilizing effects also seenin natural systems.Professor Mark Welland, Head of the Department of Engineering's NanoscienceGroup at the University of Cambridge and University Director of Nokia-Cambridgecollaboration added: "Developing the Morph concept with Nokia has provided us with afocus that is both artistically inspirational but, more importantly, sets the technologyagenda for our joint nanoscience research that will stimulate our future work together."Nano Technology has evolved as an all together different technology area in the mobileworld. Mobile phones are advancing at a great and faster pace than never before andNokia Morph is truly a mobile wonder. This phone has been developed by NokiaResearch Center and the University of Cambridge. Mobile phones like Nano Morphcertainly depict the upcoming Nano Technology and it will surely be a front-runner in theuse of various gadgets and technologies be it Computers, Air Conditioners, Robots, Carsor like this one viz Mobile phones and smartphones. Nokia Morph is truly an absolutelywonderful gadget with flexible bending and wearing options and surely the best in thegadgets segment from the house of Nokia. Wonder what will be next from Nokia,World's leader in the Communication segment.It would also feature self-cleaning to prevent wear and tear based on nanostructurescalled 'Nano flowers' which do not absorb liquids or retain fingerprints. The NokiaMorph phone would also include a detachable speaker that could clip onto the ear orconnect to the phone as a speaker. In addition, the battery issolar poweredwith built in self-charging high density solar charging modules called Nanograss which are capable of recharging faster than any other battery solution.Morph phones would have Nanosensors to inform users of wireless environments andenable them to make choices on the available wireless networks. The phones would alsobe able to analyze the pollution levels of the environment and monitor the user'ssurroundings

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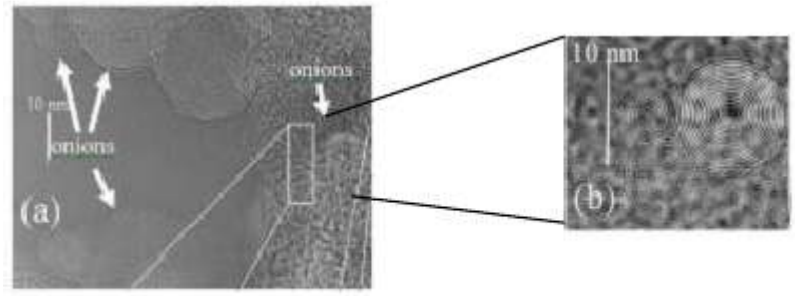
2..3 VARUIOUS NANOTECHNOLOGIES USED

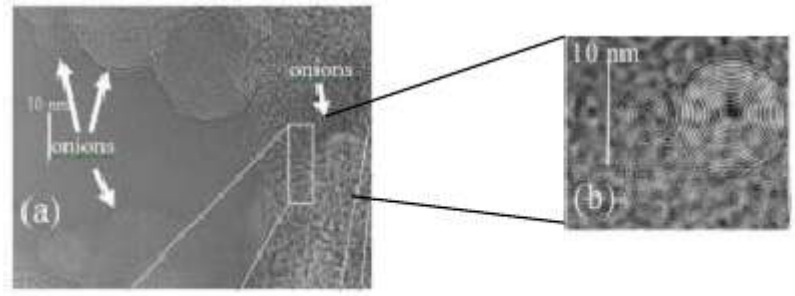
2.3.1 NANO-ENABLED ENERGY

Nanotechnology holds out the possibility that the surface of a device will becomea natural source of energy via a covering of "Nanograss" structures that harvestsolar power. At the same time new high energy density storage materials allowbatteries to become smaller and thinner, while also quicker to recharge and ableto endure more charging cycles.

2.3.1 ENHANCED ENERGY DENSITY BATTERIES

– Nanostructured electrodes for very low equivalent series R energy sources– New electrolyte solutions (ionic liquids) for safe and high power batteries.Deformable and bendable structures.Figure 2.2 10 nm Anion and Cation for battery

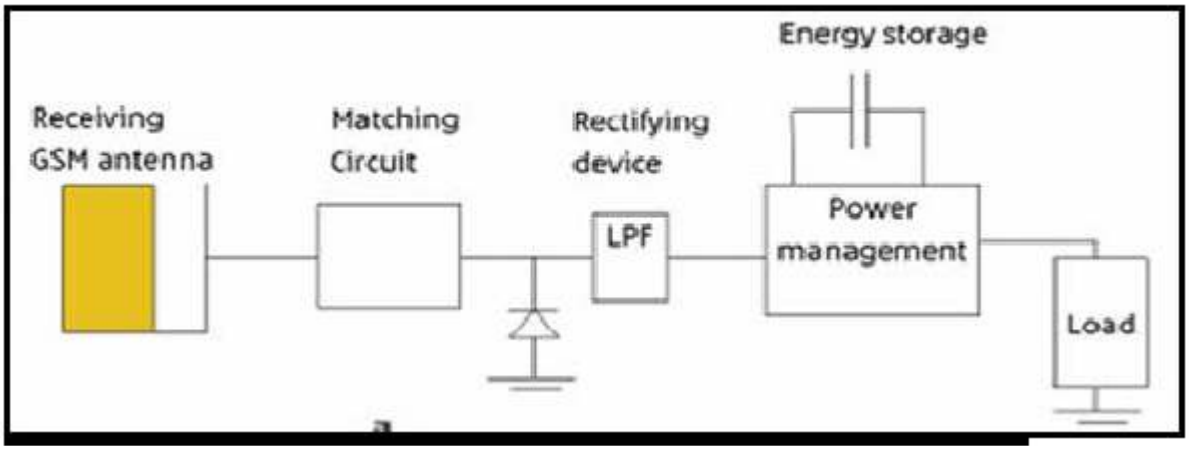




2.4 SENSING SURFACES

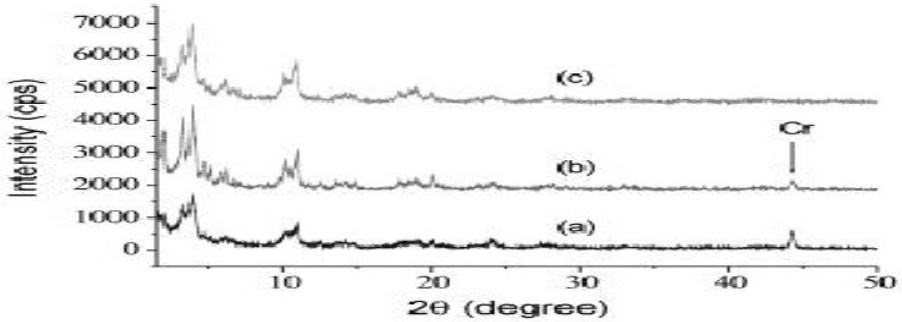
Nanosensors would empower users to examine the environment around them incompletely new ways, from analyzing air pollution, to gaining insight into bio-chemicaltraces and processes. New capabilities might be as complex as helping us monitorevolving conditions in the quality of our surroundings, or as simple as knowing if thefruit we are about to enjoy should be washed before we eat it. Our ability to tune into ourenvironment in these ways can help us make key decisions that guide our daily actionsand ultimately can enhance our healthFigure 2.4 Circuit

Diagram for Solar CellFigure 2.51 Sensing surface and Graph



2.5 Functional Biomaterials

There is a big demand for biomaterials to assist or replace organ functions and to improvepatients' quality of life. Materials options include metals, ceramics and polymers.Unfortunately, conventional materials are used that werenot specifically developed for biological applications.Interaction between biomaterialsand natural tissues is an important subject for biomaterial science Such information isessential to aid the design of new biocompatible biomaterials.The vision of ambient intelligence describes a network of sensors connected to one ormore computing devices. Sensors will be everywhere: in your pocket, in your faucet, inyour refrigerator, at your front door, and in your running shoe. The device integrates datafrom your physical world, deduces patterns, identifies issues, consults with Internet ervices, and responds with intelligence—seeming to anticipate your every need—all atthe rapid pace of your daily life.



RD patterns of as-synthesized chromium trimesate (MIL-100) synthesized by microwave method in various crystallization times: (a) 1 h, (b) 2 h, and (c) 4 h at 220 °C. The unreacted metallic chromium is shown in (a) and (b).

3.1 FEATURES AND CHARACTERSTICS

3.1.1Flexible & Changing Design

Nanotechnology enables materials and components that are flexible, stretchable,transparent and remarkably strong. Fibril proteins are woven into a three dimensionalmesh that reinforces thin elastic structures. Using the same principle behind spider silk,this elasticity enables the device to literally ch ange shapes and configure itself to adaptto the task at hand.A folded design would fit easily in a pocket and could lend itself ergonomically to beingused as a traditional handset. An unfolded larger design could display more detailedinformation, and incorporate input devices such as keyboards and touch pads.Even integrated electronics, from interconnects to sensors, could share these flexibleproperties. Further, utilization of biodegradable materials might make production andrecycling of devices easier and ecologically friendly.

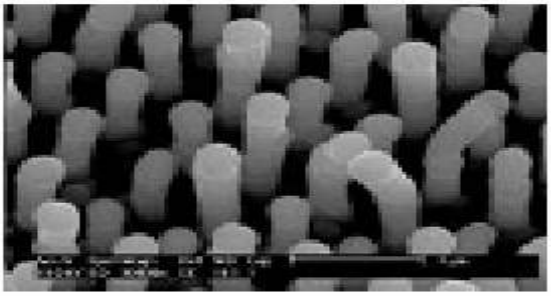
3.2.2 Self-Cleaning

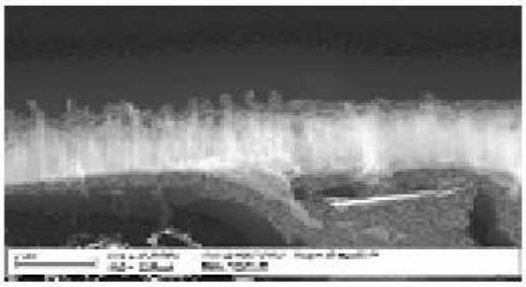
Nanotechnology also can be leveraged to create self-cleaning surfaces on mobile devices,ultimately reducing corrosion, wear and improving longevity. Nanostructured surfaces,such as "Nanoflowers" naturally repel water, dirt, and even fingerprints utilizing effectsalso seen in natural systems.A Nanoflower , in chemistry, refers to a compound of certain elements that results informations which in microscopic view resemble flowers or, in some cases, trees that arecalled nanobouquets or nanotrees. [1] These formations are nanometers long and thick sothey can only be observed usingelectron microscopy Nanoflowers" naturally repel water, dirt, and even fingerprints utilizing effects also seenin natural systems. That is why it is used for self cleaning purpose.Zinc oxide changes resistance when molecules of ethanol vapour stick onto it in a processcalled adsorption. The flower-like structures work at lower temperatures because theirtiny size enhances adsorption. Each flower is made up of bundles of nanorods 15nmwide. They were made by blasting a zinc-containing solution with ultrasound.

3.3.3 Advanced Power Sources

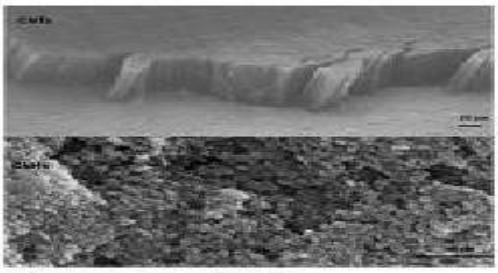
Nanotechnology holds out the possibility that the surface of a device willbecome a natural source of energy via a covering of "Nanograss" structuresthat harvest solar power. At the same time new high energy density storagematerials allow batteries to become smaller and thinner, while also quickerto recharge and able to endure more charging cycles.

Figure 3.3 Nano Grass for solar cell





Energy storage



Nanostructured carbon

3.3.4 Sensing The Environment

Nanosensors would empower users to examine the environment around them incompletely new ways, from analyzing air pollution, to gaining insight into bio-chemicaltraces and processes. New capabilities might be as complex as helping us monitorevolving conditions in the quality of our surroundings, or as simple as knowing if thefruit we are about to enjoy should be washed before we eat it. Our ability to tune into ourenvironment in these ways can help us make key decisions that guide our daily actionsand ultimately can enhance our health

Sensing surfaces using piezoelectric nanowire arrays

ZnO exhibits an unusual combination of properties, including uniaxial piezoelectricresponse and n-type semiconductor characteristics. Nokia is exploiting these qualities toachieve strain-based electromechanical transducers—ideal for touch-sensitive (evendirection-sensitive) surfaces.Arrays of ZnO nanowires can be fabricated at low temperatures (roughly 70-100°C),providing compatibility with polymer substrates, such as polyethylene terephtalate (PET).By coating a substrate (silicon, glass, or PET) with an array of these ZnO nanowires, theelectrical signals on the surface can be activated by mechanical force. Since ZnOnanowires and nanoparticles are nearly transparent, this technique can be used to developcompliant, touch-sensitive, active matrix arrays that sit on top of displays or otherstructural elements

4. CONCLUSIONS

According to the developers, using nanotechnology can lead to low cost manufacturingsolutions as well as adjustable, empowering devices, bringing us new,

versatilepossibilities. These mobile devices will be flexible, stretchable and shape changing, sothat they can be easily integrated in our everyday routines without special adjustments onour part. Unfortunately, it might take close to a decade until the elements of Morph mightbe available for integration into handheld devices.Nanosensors would raise the awareness of mobile devices' users to the environment in anew way. When air pollution or bio-chemical traces and processes are right before oureyes, we will not be able to ignore them. It will also enhance our natural abilities and easeour daily decisions even on small matters such as whether or not to wash a certain fruitbefore eating it

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