Sapphire Crystal in Future Smart Computers

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Abstract
Scope of this paper describes the gist of Sapphire Crystal and is "the happening" in the news now. You readers of this research paper will be amazed how technology is fascinating and crazy through successful R&D. It has become extremely powerful at extending the wear of gem-stones as jewelry and accessories in luxury high-end life style to creative and innovative use in future smart computer and other products that you will not believe. You will know where natural Sapphire gem-stones originally come from to knowledge of how Sapphire Crystal is high-techly processed and made. You will also be amazed to see how Sapphire Crystal will be used in future smart computers and other various products. Also, when you find out that giant companies like Apple Inc. and other leading high-tech manufacturers and companies from Taiwan and China are also moving fast to flaunt their successful research and development, you will realize how astonishing and credible Sapphire Crystal is. Not only that, but also you will see that Technology Advancement is faster in pace than Human Communications and Demands yet people will adapt to it one way or another. At the end, you will appreciate the benefits of Sapphire Crystal on Smart Computers, Societies and governments.

Keyword
Future smart computer

1. Introduction

Sapphire Crystal is main headlines in the news now. Also when Apple Inc. invests $2 billion in a new Plant, this makes us think that Apple is definitely up to one of its latest wonder materials. Also its vision in Smart Future Computers is hiding for us accelerating advanced technology, components and design. Efficiency, convenience and space are also necessities. At present, Technology Challenges has overtaken Human Demands instead of the opposite in the past.

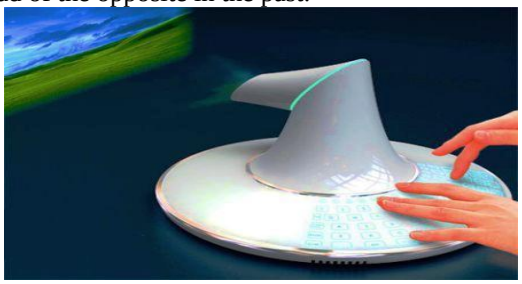

Figure 1. Sapphire Crystal in Future Smart Computers

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Sapphire Crystal is "The Happening" at present among technology challenges. It has received an unpresented success in extreme precision and speed. Sapphire Crystals has proven its success in many areas such as not limited to high-end watches, luxury mobiles, wafers to smart computer, semiconductors and components.
R&D now is providing fantastic results that use of Sapphire Crystal in future smart computers will take humanity and communication to an era where its users need to adapt to such unpresented advanced technology sooner or later.
Use of Sapphire Crystal technology in future computers will concurrently bring unbelievable advantages to humanity and society as well. Enormous benefits that humans can not keep pace with.

2.Related Work

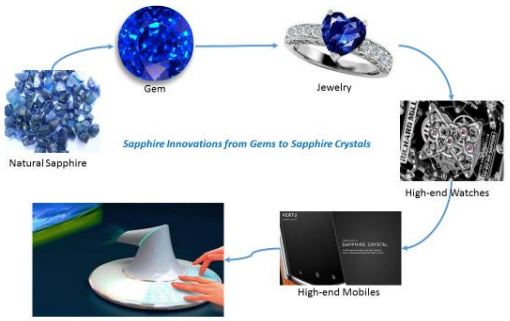
2.1.Where Sapphire Comes From

Natural sapphire mines mainly are in India, Vietnam, Thailand, China, Burma, Madagascar, Nigeria, Tanzania, Sri Lanka and some others.

Prior to 2007, Australia was the largest producer of natural sapphire in the world. However, Madagascar has since then replaced Australia to become the new of natural sapphires production. Other commercial mining locations for sapphire and ruby includes:

- Myanmar, Burma,
- Thailand, Laos
- Cambodia, Vietnam
- India, Pakistan
- China, Sri Lanka
- Kashmir, Nepal
- Afghanistan, Tajikistan
- Colombia, Montana (USA)
- Kenya, Malawi
- Nigeria and Tanzania.

2.2.Sapphire Gem to Sapphire Crystal



Sapphire Crystal Research and Development has been so adventurous and interesting yet sometimes disappointing but tempting and challenging. R&D in Sapphire Gem derivatives has been so innovative and creative over the last several decades. Sapphire Crystal Technology has derived use of Sapphire not only as a precious stone but also as glass top-bottom covers for luxury high-end watches. Sapphire Crystal technology innovation and creation then has reached screens of mobile phones such as iphone, Virtue… etc. It did not stop there but current Sapphire Crystal R&D has successfully been tested in some key components of future smart computers such ic-circuits, diodes, semiconductors, blue-rays, processors and touch screens.

2.3.Sapphire Gem

"Sapphire" came from the Latin word "Sapphirus" which means "Blue Stone". Natural Sapphire is typically a blue gemstone variety of the mineral Corundum which is an Aluminum Oxide (AL203).

Components trace amounts of elements like Iron, Titanium, Copper, Chromium and magnesium gives Corundum respectively the colors:

- Blue
- Yellow
- Orange
- Orange
- or Green

Chromium impurities in Corundum yield pink or red tint (Ruby).

Sapphire is divided into 3 categories:

1. Classic Metamorphic
2. Magmatic (non-classic Metamorphic)
3. Classic Magmatic

Classic Magmatic Sapphires are lavishing and available in India, Kashmir, Sri Lanka and Burma. While Logan Sapphires, are the brilliance of India but in fact are originated from the mines of Sri Lanka.

Commonly, Sapphires are worn in jewelry. Sapphires may be found naturally, by searching through certain sediments or rock formation or mined from alluvial and primary underground workings.

2.4.Sapphire Crystal

Synthetic Sapphire Crystal (Artificial) was first produced by a French chemist Auguste Verneuilin1902. However, the artificial Sapphire material produced has high internal strain and hence was not ideal for industrial application as Sapphire Crystal used for industrial application need to be made without flaws.

Many methods of manufacturing Sapphire Crystal for industrial application today are variations of the Czochralski process which was invented in 1916 by Polish chemist Jan Czochralski. However, Synthetic Sapphire is also produced industrially from agglomerated aluminum oxide AL2O3, sintered and fused in an inert atmosphere, yielding a transparent but slightly porous polycrystalline product.

The main component of Sapphire is alumina (AL2O3), which is made up of three aluminum atoms and two oxygen atoms covalently bound together in a single hexagonal lattice structure.

Sapphire Crystal is simply a single piece of clear transparent sapphire. Such sapphire is made exactly the same way when manufacturers of semiconductor grow single crystals of silicon.


Sapphire Crystal grown in a Boule


Boules of Sapphire Crystals


Sapphire Crystal cut in cylinders

Manufacturers dip a tiny-seed of sapphire into a tank of liquefied alumina, then run through "boules" process which is carefully drawn upwards into a thin cone-shape which is a very expensive process due to its massive consumption of energy like electricity. These carrot style crystals are then cut into slices that are shaped and polished which ends up with huge wastage. That's which it is used carefully and in quantities that are small.

Sapphire substrates are ideal for use in LED and Non-LED application in view of its outstanding properties namely resistance to high temperature (melting point at 2,045 ℃); resistance to scratching and abrasion (value of 9 on Mohr scale of material); good electrical insulation and low dielectric loss.

Sapphire substrates in LED lighting helps prevent stray currents caused by radiation from spraying to nearby circuit elements. The crystal structure enable LED lights to have a wider beam angle and highly transparent to wavelength of light between 150 nm (Ultra-violet) and 5500 nm (Infra-red) while the high strength and scratch-resistance of Sapphire substrate makes it more suitable for covering lenses, buttons and display for non LED application such as smart computers and smart phones.
Crystal Sapphire are grown in boules as singles then core drilled in cylinder shape rods then carefully sliced.
This raw Sapphire Crystal Ingot will then be required to undergo SUNPHIRE's cutting, grinning and polishing process in order to be transformed into Sapphire Cylindrical rods of different sizes and form various form / shape and sizes (as per pictures on the right hand side) in accordance with Buyer's requirement and specification


Raw Sapphire Crystal Ingot


Sapphire Crystals Rods in different sizes


Sapphire Crystal ready for end product

Sapphire Crystals Growth process is a clean process without emissions while the cutting / grinning / polishing and patterning process substrate generated little waste volume, mainly in the way of recycling as pollution waste water will be discharged after treatment via a sewage treatment system .However, the limited amount of exhaust gases produced by the dry etching patterning process will be appropriately treated to ensure clean and safe emission.


SUNPHIRE's 100 KG KY SAPPHIRE GROWER / FURNANCE

2.5 Sapphire Crystal in Smart Computers

Smart Computers has made a significant presence in our life and has controlled most of it compared to any other thing. Sapphire Crystal is also coming from far to be widely used in smart computers.
Sapphire Crystal is coming to replace Non-LED screens and applications in smart computers. While Non-LEDs and general lighting continue to make up a major chunk of Sapphire substrate market share, wider non-LED application usage has had a dramatic increase in 2014. In fact, the Sapphire substrate industry is anticipated to grow due to the Non-LED application such as smart computers screens and other modules due to its high ability to withstand both low and high temperatures and components that are damage resistance.
While in LED applications, the capability to reduce energy consumption of the Sapphire based LED lighting system has ,in fact, caused manufacturers to initiate a policy in october,2009 to promote the greater use of LED lighting system nationwide so as to reduce the energy consumption in order to reduce the Carbon Foot-print thereby contributing positively towards the "Lowering the effect on world climate change" initiative .
This policy has, in-fact, creating great demand for Sapphire cylindrical rod which is the key building block for LED lighting system valued at 25.7 billion according to the latest 2015 report by LED inside on the global LED lighting market trends. However, the demand for better quality LED lighting in terms of brightness and efficiency at affordable cost has further created a new opportunity for those manufacturers who are capable of producing higher quality and larger size Sapphire cylindrical rod at affordable cost to meet this additional niche market.

Blue Ray Beam Nano-patterned sapphire substrate etching (Patterned Sapphire Substrate; PSS), through controlled etch uniformity and etch depth, effectively improve the internal quantum efficiency of the light emitting diode (LED) with an external light extraction efficiency, the light emitting diode (LED) has better performance photovoltaic characteristics. Once the substrate using the

PSS, the brightness of a chance than the original LED increase 20 to 30 %, over ninety percent of current LED production line have been used directly.

Sapphire Crystal invention in smart computer components like screens, ic-chips, semiconductors, memories … etc. are reliable, quality, durable, hard but heavy and expensive. Use of Sapphire Crystal in smart computers and required related premium materials has innovated a trend of class language and fashion lifestyle of a hot new story of Sapphire Crystal.

Sapphire Crystal innovations are informing manufacturers that Sapphire Crystal is coming to replace Gorilla LED screens in Smart computers due to its extreme hardness, effectiveness and figureless trace. On the other hand, current researches have led to successful use of modified Sapphire Crystal as Substrate for Semiconductors Circuits in smart computers.

Wafers of single sapphire crystal are used in semiconductors as substrate where it will be used in LED also in blue emitting light diodes.

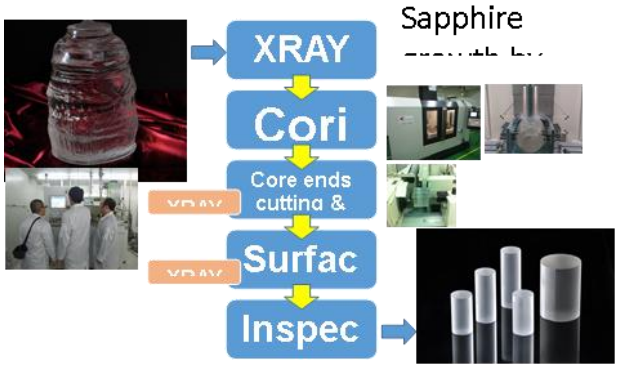
Sapphire crystal was also successfully used in depositing silicon to make integrated circuits known as SOS (Silicon On Sapphire). Accordingly researches are being conducted due to their properties for use in digital circuitry on IC chips in smart computers

High-tech advance technology has also developed the Kyropoulous (KY) with a high yield technological process and equipment for production of quality large Kg Synthetic Sapphire Crystal Ingot at competitive cost for:

1. Sapphire Crystal for smart computers components.
2. Sapphire Crystal for smart computers LED screens.
3. Sapphire Wavers.
4. Sapphire Ingot Corning.
5. Sapphire Single Crystal Technology.
6. Sapphire Substarate.
7. Sapphire Crystalline Characterization.
8. Process Automation.
9. Sapphire Crystal Scrap Utilization.
10. Developing Next Generation Silicon Carbide.

On the other hand, Sapphire Crystal also boosts the speed of processers which in turn boosts the operation speed of the Software (Programs) to space speed to get billions of transactions done.

Sapphire Crystal multi-task function also are being tested for its use in smart computers for Blue and white light-emitting diode (LED) substrate material, also for high-speed components and high frequency components of the substrate (silicon on sapphire).



Smart computers with Sapphire Crystal technologies will make smart computers to be able to smell. Such technologies will be able to detect information just by smelling. It will also tell you the health condition ahead of time; i.e. if you are going to get sick.

2.6. Sapphire Crystal in Other Products

Some of the known industrial application of the Synthetic Sapphire Crystal have been summarized as follows:

1. Camera lenses and special optical products and component materials.
2. High power laser lens material.
3. Missile warhead mask material.
4. Precision machinery bearing material.
5. Aerospace and Aviation (Avionics) display equipment.
6. High-end watches.
7. Barcode Sensors due to its ruggedness.
8. Bullet proof glass.

In parallel, some industries are growing Sapphire Crystal and hoping their researches will successfully allow use of Sapphire Crystal in new fields like in:

1. Surgical Blades.
2. Missile Domes.

The main back-draw for these industries is the high energy electricity consumption

2.7. Why Apple

When Apple moves, the world watches and knows that Apple is up to something legendary. Apple through GT Advanced Technologies invests $ Billion in improved equipments and machineries to grow Sapphire Crystal for its future smart computers and other products; “hot” products are definitely are coming soon.

Apple slice Sapphire Crystal Boules using laser while other manufacturers use diamond saws, both techniques are slow, difficult and expensive. Apple intends to have Sapphire Crystal constitute significant part in the components of its smart computers such as touch screens, window films, blue ray beam, ic-chips, diodes and semiconductors yet reach high-end reliability, durability, efficiency, space speed, heat compatibility and user-convenience.

Apple has dedicated its factory in Arizona for production of premium Sapphire Crystal components for Apple ostentatious glamorous Smart Computers.

2.8. Taiwan and China "matter"

Taiwan as well as China are competing to be a world-class Sapphire Single Crystal Growing and Machining hub. Their objective is to slowly multiply its Sapphire Growing by four times over the coming 5 years. Herein, its Sapphire Industry will have the economic scale to supply sufficient quantity to potential customers as quickly as possible when they are in demand.

Taiwan & China are striving to be leading suppliers of sapphire products worldwide. Taiwan strives to be a leader in providing skilled workforce and professionals when it comes to Technology Transfer. Accordingly, Taiwan will assist in stimulating further development of hi-tech industries yet boost economies in other countries and globally.

Taiwan and China are keen to establish Sapphire industry as leaders in Manufacturing Sapphire Crystal and related products and become major suppliers to Asia, USA & Europe.

Taiwan has gained goodwill reputation and has been flaunting that it is the land of leading plants of high-end computer and phone products like Apple, Samsung and other products but also Taiwan has proven technology in building and supervising production facilities of Synthetic Sapphire Crystal. It is globally considered a key Know-How and investing intensively yet smartly in industries for production of Synthetic Sapphire Crystal Technology. SUNPHIRE has a track record in such technology.

Taiwan's booming success in Sapphire Crystal lays in 2 factors. First it carefully ensures that electricity-energy is cheap in conjunction with its high Know-How technology and experience. Accordingly, Taiwan ensures quality production on time and success of smart computer and high tech electronics industry. With such powerful combination, it motivates major makers of smart computers to use sapphire crystal products to achieve accelerated pace and gain. Taiwan and China have been competing as partners as almost exclusive market leaders as manufacturers Sapphire Crystal.

Taiwan is a major player in the Sapphire Crystal global market because not only for the combined reasons but also it creates the following

2.9. Which overtakes, Technology Advancement or Human Demands

In the past, Human Demands and Needs overtake Technology Advancement, now, it's the opposite. In the past decade, technology advancement has accelerated its march over human needs and demands. Innovation and research has indeed shown brilliant variety of successful results not far from the end of the tunnel soon to be implemented and in application.

Human demands put and drove the world before huge researches and innovations in various fields of computer technology being the top that we need to absorb. Computer innovations that never existed in our recent lives also has come to make a significant place in our world that we can't live without.

Analysts envision accelerated steps in computer technology is due to people communication closer and faster via internet. Such communication has helped researchers and scientists to find wider bands that makes them able to exchange ideas and experiences with others which brings benefits and added value to humanities like last few years.

Researches and studies continues to create a system operates to understand operation of human brain and create a smart application of precision development. It's an absolute necessity for digital technology now to bridge with humanity needs. At the end, humans adapt to technology. Technology advances in either researches through new inventions or development of current ideas or products. However, technology also advances through unexpected ideas or inventions by surprise in dual while working on a certain specific idea.

3. Sapphire Crystal Benefits On Smart Computers

Smart Computers with Sapphire Crystal technology are to be legendary innovations and informing users that Sapphire Crystal will take them in fascinating communication next to space. Future smart computers with Sapphire Crystal technology in its components will be:

1. Extremely space fast in its processors.
2. Boosts the operation speed of the Softwares (Programs) to space speed to get billions of transactions done.
3. Heat compatible to both low and high temperatures.
4. Energy saving through low power consumption and reduce power harmonics yet improve energy efficiency.
5. Reliable parts.
6. It will detect health.

7. Durable components.
8. High quality hardware.
9. Fingerless scratch-free rugged touch-screen.
10. Smart computers will smell.

3.1 Benefits of Sapphire Crystal Smart Computers in Training

Training rooms and halls requires powerful computers. Here, Sapphire Crystal smart computers play a significant role to do the job. Trainers or Speakers need smart computers that are reliable and extremely fast to conduct their training session successfully with low risk yet Trainees or guests need to rap pour and reciprocate accordingly and in same speed. Smart computers with Sapphire Crystal can do this job.
When it comes to Distant Training via internet and Video Conferencing, Sapphire Crystal smart computers will not only will make their communications as face-to-face but also will get the job done perfectly.

3.2 Sapphire Crystal Benefits On Societies & Countries

Manufacturing Sapphire Crystal through plants in addition to its use in smart computers, have great benefits on societies, governments and countries such as:

1. Create mega jobs and at different levels from vocational trainers to technicians to engineers to professionals to management to high education degree holders.
2. Converts all other unused electricity energy that can't be stored into wealth.
3. Setting up Sapphire Crystal factories and industries will be used as platforms for future bi-lateral related high-tech industries.
4. Create and boost lots of business opportunities at various levels.
5. Foreign exchange spin-off of financial markets as well as governments.
6. Adjacent to Transfer-of-Technology, there will be a big growth of lots of skilled workforce of high pay.
7. Develop, lift and flourish economies of these countries.
8. Utilize abundant green energy resources of the country.
9. Environment friendly with appropriate clean safe emission.
10. Energy saving
11. Low water consumption yet water is recycled for drinking, reuse and irrigation and polluted waste water is discharged after treatment through sewage treatment system.
12. Generate high ROI (Return on Investment) for governments and investors.

3.3 Back draws of Sapphire Crystal

Although Sapphire Crystal has great advantages, it has few weaknesses as well at present such as:

1. its heavy.
2. and expensive.

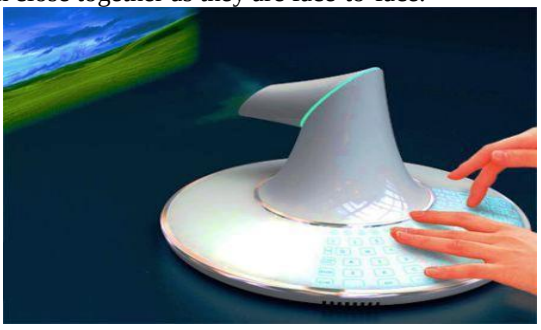
However, manufacturers are optimistic that they will overcome them soon through their innovative & creative R&D.

4. Recommendation

I strongly recommend that other researchers carry on other researches and explore other areas and shed light on Sapphire crystal in future smart computers.

5. Conclusion

Sapphire crystal makes "the future of smart computers already here" Smart computers components with Sapphire Crystal technology will make applications and communications between people space-fast and will bring them close together as they are face-to-face.



Smart computers with sapphire crystal components in the very near future will be user-convenient, energy efficient, cyber fast and heat compatible. Quality components such as IC-chips, processors, diodes, blue-rays, LED-touch fingerless scratch resistance screens. Although these parts are expensive to make at present but are reliable and durable.
Future smart computers with sapphire crystal parts not only will be a piece of art but also a high-end language and luxury class as if they are sapphire gem.

"Sapphire Crystal future smart computers will change who you are".

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