

# An Survey about Diamond Chip and Its Applications

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**Abstract**—Diamond Chip or carbon Chip is an electronic chip made on a Diamond basic Carbon wafer or it very well may be likewise characterized as the electronic part made utilizing carbon as the wafer. The real part utilizing carbon is (cnt) Carbon Nanotube. The precious stone chip is the insurgency in IT industry, which replaces the need of silicon. Silicon utilized has thought of certain burdens when utilized in power electronic applications, for example, substantial size, moderate working velocity and so on. The paper directs a review on precious stone chip and its applications.

**Index Terms**— Silicon, Germanium, Carbon Nano tubes, Diamond chip, Graphene

## I. INTRODUCTION

In antiquated time, both silicon and germanium were utilized in the assembling of gadgets parts. Unadulterated silicon and germanium are semiconductors in ordinary temperature. However, later it is discovered that germanium has numerous burdens when contrasted with silicon, for example, huge turn around current, less dependability towards temperature and so forth so in the business concentrated on creating electronic parts utilizing silicon wafers. Researchers have discovered that carbon is a greater number of preferences than silicon. By utilizing carbon as the assembling material, we can accomplish littler, quicker and more grounded chips. They are prevailing with regards to making littler models of carbon chip. They concocted a noteworthy segment utilizing carbon that is "carbon nanotube", which is generally utilized in most current microchips and it will be a noteworthy segment in the precious stone chip. diamond chip or carbon chip is an electronic chip fabricated on a jewel basic carbon wafer. Or on the other hand it very well may be additionally characterized as the electronic segment produced utilizing carbon as the wafer. The real segment utilizing carbon is (cnt) carbon nanotube. Carbon nanotube is a nano-dimensional made by utilizing carbon. It has numerous interesting properties.

- To make it leading, the doping procedure is performed. Boron– as the p-type. Nitrogen– as the n-type. Jewel basic carbon is non-leading in nature. A portion of the carbon allotropes go about as a semiconductor. It has not exactly a one-nanometer breadth. Precious stone structure of lonsdaleite looks precisely like a jewel.
- Carbon nanotubes are the most grounded and stiffest materials yet found as far as rigidity and flexible modulus separately.

A portion of the basic uses of carbon nanotube are as per the following:

- data and correspondences,
- materials and assembling,
- Biomedical,
- Energy and ecological,
- Transportation
- Consumer products.

A portion of the upsides of precious stone chip over silicon chip are as per the following:

- It conquers the disservices of silicon as massive size, it is of little size
- Diamond chip works at the higher temperature.
- Diamond chip is quicker than silicon chips.
- Diamond chip gives bigger power dealing with limit.
- Precious stone chip additionally has a few weaknesses which are as given beneath:
- As expected, the precious stone chip is costlier than the silicon chip.
- doping process is difficult to perform because of the precious stone structure.

## II. DIAMOND CHIP CONSTRUCTION

Unadulterated precious stone auxiliary carbon is non-leading in nature. So as to make it leading we need to perform doping process. We are utilizing boron as the p-type doping specialist and the nitrogen as the n-type doping operator. The doping procedure is like that on account of silicon chip producing. In any case, this procedure will take additional time contrasted and that of silicon since it is extremely hard to diffuse through emphatically reinforced precious stone structure. Cnt (carbon nanotube) is as of now a semiconductor. A precious stone semiconductor works on 81ghz recurrence, and is more than double the speed of prior gadgets. This specific chip was first created by nippon broadcast and phone partnership (ntt), japan. Not at all like silicon and germanium, unadulterated carbon isn't a semiconductor in room temperature. Subsequently, so as to make it a semiconductor, we utilize a portion of the allotropes of carbon.

Graphene is one of the allotropes of carbon which goes about as semiconductor. In this manner, nanotubes, which are gotten from graphene, will likewise go about as semiconductor. Graphene is an allotrope of carbon, whose structure is one-particle thick planar sheet of sp<sup>2</sup>-fortified carbon iotas that are thickly stuffed in a honeycomb precious stone lattice .some of the properties of graphene are:

1. Graphene has amazingly high electron portability at room temperature.
2. Graphene structure can be doped effectively by utilizing concoction dopants and can be changed over back to its undoped structure just by warming gradually in vacuum.

Collapsing the graphene sheet into a cylinder like structure produces carbon nanotubes. It is a nano measure chamber of carbon particles. They are made of one or a few concentric dividers in which carbon particles are organized in hexagonal example, having a short of what one nanometer distance across. In a vacuum chamber, the scientists vaporized the metals tantalum and iron, which settled in layers on a silicon wafer. At that point they set the covered wafer toward one side of a quartz tube, which was embedded into a heater. At the wafer's finish of the cylinder, the heater temperature was 475 degrees c; however at the contrary end, the temperature fluctuated. The analysts siphoned ethylene gas into the cylinder from the end inverse the wafer. At the point when the temperature at that end moved toward 800 degrees, the ethylene decayed, and the iron on the wafer catalyzed the arrangement of carbon nanotubes.

## III. ADVANTAGES OF DIAMOND CHIP

- A. Carbon nanotubes are the most grounded and stiffest materials yet found as far as rigidity and flexible modulus separately. This quality outcomes from the covalent sp<sup>2</sup> bonds shaped between the individual carbon iotas. In 2000, a multi-walled carbon nanotube was tried to have an elasticity of 63 gigapascal.
- B. Standard single walled carbon nanotubes can withstand a weight up to 24GPa without distortion. They at that point experience a change to overly hard stage nanotubes. Most extreme weights estimated utilizing current test systems are around 55GPa. Nonetheless, these new very hard stage nanotubes breakdown at a much higher, but obscure, weight.
- C. Multi-walled nanotubes are numerous concentric nanotubes unequivocally settled inside each other. These display a striking extending property whereby an inward nanotube center may slide, nearly without grating, inside its external nanotube shell, subsequently making a molecularly flawless direct or rotational bearing. This is one of the principal genuine instances of sub-atomic nanotechnology, the exact situating of particles to make valuable machines. This property has been used to make the world's littlest rotational engine.
- D. Being covalently fortified, as electrical conveyors they don't experience the ill effects of electro movement or nuclear dissemination and consequently can convey high flow densities (107 - 109 A/cm<sup>2</sup> ), which is multiple times that of copper.Both metal and semiconductor can be framed.
- E. All nanotubes are required to be generally amazing warm conductors along the cylinder, displaying a property known as "ballistic conduction", yet great covers horizontally to the cylinder pivot.
- F. Because of the nanoscale measurements, electrons spread just along the cylinder's hub and electron transport includes numerous quantum impacts. Along these lines, carbon nanotubes are as often as possible alluded to as "one-dimensional".
- G. As the extent of the carbon molecule is little contrasted and that of silicon particle, it is conceivable to scratch littler lines through jewel basic carbon. We can understand a transistor whose estimate is one in hundredth of silicon transistor.
- H. Diamond is all around unequivocally fortified material. It can withstand higher temperatures contrasted and that of silicon. At high temperature, precious stone structure of the silicon will crumple. Be that as it may, jewel chip can work well in these raised temperatures. Precious stone is excellent conductor of warmth. So if there is any warmth dispersal inside the chip, warmth will all around rapidly exchange to the warmth sink or other cooling mechanics.
- I. Carbon chip works quicker than silicon chip. Portability of the electrons inside the doped jewel auxiliary carbon is higher than that of in the silicon structure. As the measure of the silicon is higher than that of carbon, the shot of

impact of electrons with bigger silicon molecules increments. Yet, the carbon particle estimate is little, so the shot of crash diminishes. So the versatility of the charge bearers is higher in doped precious stone basic carbon contrasted and that of silicon.

- J. For control hardware application silicon is utilized, yet it has numerous drawbacks, for example, mass in size, moderate working velocity, less effectiveness, lower band hole and so on at exceptionally high voltages silicon structure will fall. Precious stone has an emphatically fortified gem structure. So carbon chip can work under high power condition.

#### IV. APPLICATIONS OF DIAMOND CHIP

Diamond wafer technology is creating more slender and less expensive gadgets as of now being used in data innovation, the military and aviation applications. Also, jewel semiconductor will majorly affect the purchaser gadgets, media communications and wellbeing businesses, among numerous others, beginning as ahead of schedule as 2015. Automakers are looking at utilizations of precious stone power gadgets in control modules for electric vehicles. Jewel semiconductors can likewise help better oversee battery life and battery frameworks for a wide assortment of gadgets including telephones, cameras and vehicles. For cloud PC servers, which are put away in server farms that devour immense measures of vitality in an exceedingly inefficient way, precious stone semiconductors utilize less vitality all the more effectively while conveying better execution. Since precious stone innovation shrivels the size and vitality required for a semiconductor, it makes ready for littler individual hardware from washers and dryers to TVs and advanced cameras. With respect to barrier innovation, it conveys more prominent range, dependability, and execution in both typical and outrageous/perilous working conditions. Jewel semiconductors lead to a more prominent range and vitality effectiveness in their applications. They help drive less expensive, quicker cloud coordination for shopper and business needs. They change the capacity of where and how to utilize our telephones, PCs and other individual electronic gadgets that still can't seem to be developed with the advantages broadening admirably past execution. Power gadgets, for example, jewel semiconductors speak to a colossal chance to decrease electronic waste and cut electronic chilling expenses off the middle.

#### V. CONCLUSION

Carbon is a bigger number of points of interest than Silicon. By utilizing carbon as the assembling material, we can accomplish littler, quicker and more grounded chips. In this way jewel chip replaces the need of silicon in each viewpoint in future age. As the examination proceeds with it uncovers its conceivable application in the fields of science, military, business use and designing. The present paper leads an overview on precious stone chip and its potential applications in not so distant future.

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