Copper Graphene Transmission Cable

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Abstract— The copper cables used has many drawbacks and losses like i^2 r losses and the tensile strength etc. In order to reduce these losses the evolution of Cugraphene composite has evolved. This new power lines will contain the addition of graphene(less in ratio proportion) than that of copper (base metal) in the commercial power transmission cables has made a new flourished trend. Graphene is 200 times stronger than steel and 500 times stronger than copper, and it has much tensile strength with copper. Though graphene transfers electrons at much faster rate hence it replaces the conventional cables with improved efficiency. The current density of graphene is 10^6 times greater than copper and its intrinsic mobility is 1000 times more conductive than silicon. Therefore it conducts electricity much better than copper. The thermal conductivity is 2000 Watts per meter per kelvin which is 5 times higher than copper, so it conducts heat better than any other known material. The electrons in the valence shell are free to move, so it conducts electricity much faster than copper, therefore the electrical conductivity is also high. Using CVD [Chemical Vapor Deposition], the Cu GRAF is kept between 800 and 900 degree Celsius. Then they are tested it in saline water and witnessed to corrosion almost that with the existing commercial copper.

Keywords: copper, graphene, CDV, ball mining process

I. INTRODUCTION

Graphene revolutionize the power lines. The interest for power is developing the world over. Both generation and transmission are becoming posing a great challenge to the human beings. Right now utilized links convert a piece of vitality into heat, which prompts substantial misfortunes (i.ei^2R losses).When the electrical cables convey more influence, they discharges heat into condition. Another reaction is that, at high temperature their mechanical quality and obstruction diminishes.

The combination of graphene with copper yields a composite called Cu-graphene. This composite will have better than expected electrical and conductivity. Dissimilar to customary electrical cables, the new links will tend to withstand high temperature conditions. Cugraphene composite improves coppers protection from erosion by about multiple times. The emotional expansion of the metals helpful life could bring about noteworthy cost reserve funds for a wide scope of businesses.

II. PROPOSED METHODOLOGY

A. Graphene:

Graphene is an allotrope of carbon. Its thickness is 0.345 nm. The carbon is tightly bonded and it consist of a layer of carbon atoms which is arranged in a lattice of hexagon and hybridization is sp^2. It has both holes and the electrons in the valence shell is 4. The strength of graphene is 0.142 nm, so it is the strongest materials ever discovered. It is very light of about 0.77 mg/m^2. The tensile strength of graphene is 130 giga Pascal's. It has low resistance and high conductivity. There by it draws low current from the circuit. It is minimally toxic. In this, every carbon molecule is associated with three other carbon iotas on a two-dimensional plane, which departs one electron free for electronic conduction.

Graphene is a level honeycomb grid made of a solitary layer of carbon particles, which are held together by a spine of covering sp2 half and halves bonds. This nanocrystal is an essential structure obstruct for all other graphitic materials; it likewise speaks to a theoretically new class of materials that are just a single iota thick, purported two-dimensional (2D) materials (they are called 2D in light of the fact that they reaches out in just two measurements: length and width; as the material is just a single particle thick, the third measurement, stature, is viewed as zero).

1) Electronic properties

Researchers have discovered that graphene stays fit for leading power even at the point of confinement of ostensibly zero transporter focus on the grounds that the electrons don't appear to back off or restrict. The electrons moving around carbon iot as collaborate with the intermittent capability of graphene is honeycomb cross section, which offers ascend to new quasiparticles that have lost their mass. That implies that graphene conducts constantly. It was likewise discovered that they travel far quicker than electrons in different semiconductors.

2) Mechanical Properties

The noteworthy characteristic mechanical properties of graphene, its firmness, quality and strength, are one reason that make graphene stand apart both as an individual material and as a strengthening operator in composites. They are brought about by the security of the sp2 bonds that structure the hexagonal grid and contradict an assortment of in-plane misshapening.

3) Potential Properties:

While the advancement of electronic parts has been advancing at a high rate throughout the most recent 20 years, control stockpiling arrangements, for example, batteries and capacitors have been the essential restricting element because of size, control limit and productivity (most kinds of batteries are wasteful, and capacitors are even less so). For instance, with the advancement of presently accessible lithium-particle batteries, it is hard to make a harmony between vitality thickness and power thickness; in this circumstance, it is basically about bargaining one for the other.

In introductory tests did, laser scribed graphene (LSG) super capacitors (with graphene being the most electronically conductive material known, at 1738 Siemens for each meter (contrasted with 100 SI/m for actuated carbon)), were appeared to offer power thickness practically identical to that of high-power lithium-particle batteries that are being used today. That, yet in addition LSG super capacitors are profoundly adaptable, light, speedy to charge, meager and as recently referenced, similarly modest to deliver. Graphene is an incredibly unadulterated substance,

because of its straightforward, organized structure dependent on tight, ordinary, nuclear holding, Carbon is a non-metal, so you may expect graphene to be one as well. Truth be told, it acts substantially more like a (however the manner in which it conducts power is altogether different), and that is driven a few researchers to portray it as a semimetal or a semiconductor (a material mid-route between a transmitter and a cover, for example, silicon and germanium). All things being equal, it's also to recollect that graphene is exceptional and perhaps novel.

B. Strength:

In the event that you've at any point jotted with a delicate pencil (something like a 4B), you'll realize that graphite is unpleasantly delicate. That is on the grounds that the carbon layers inside a stick of graphite shave off effectively. Be that as it may, the iot as within those layers are firmly fortified along these lines, similar to carbon nanotubes (and not at all like graphite), graphene is super-solid—significantly more grounded than precious stone! Graphene is other material-preferable by a wide margin over splendid warmth conduits such as silver and copper, and far superior to either graphite or precious stone. Once more, we're well on the way to find the advantage of that by utilizing graphene in composite materials, where we could utilize them to add additional heat resistance or conductivity to plastics or different materials

C. Algorithm

1) The sample of Cu-graphene is weighed and taken.
2) The quantity of the sample is Cugraphene-[For example, take cu6 grams and Graphene-0.5 grams that is, it is in the ratio of 10:100].
3) The sample is kept under ball milling for 15 hours in order to reduce the size of the micro particles in to Nano size.
4) These Nano sized sample is compressed at 4100 ton pressure to bring them to appropriate size. As a result it yields a solid composite.

Fig. 1: The given sample is weighed

Fig. 2: The given sample is weighed and kept under 3000 ton pressure to make a cable

Fig. 3: Finally the sample is used for various tests and finally it replaces our traditional cables.

This composite is then kept under CVD at 700 degree Celsius in argon temperature for 5 hours for the bonding of atoms.

5) Though the valency of carbon is 4, it is easily bonded. Thus the new cable Cu- graphene composite is prepared.

III. RESULT ANALYSIS

1) The main application is that it replaces our normal transmission lines into modern cu-graphene cables.
2) It can be used in dc motors there by the use of brushes is reduced.
3) It could replace silicon chips.
4) It can be used in batteries that could last longer i.e. rechargeable batteries.
5) It tackles the framework issues everywhere throughout the country because of its high special electrical and warm attributes of graphene which permits multiple times higher flow thickness limit, giving increasingly effective and dependable conveyance of electrical energies.
6) It can be used as super capacitor and its efficiency is much higher. It can be used as Nano particle for sensor applications.
7) This copper graphene composite can be used in drinking water treatment.
8) It eliminates the use of copper and other metals due to its high conductivity and its tensile strength and it is cost efficient.

IV. CONCLUSION

The copper graphene composite thus revolutionizes the world by its electrical and mechanical property. Due to its high conductivity and its low resistivity with copper and its valence electron at the valence shell the bonding between them is much easier and covalent, it can be used as transmission cables. Due to its stability and its tensile strength with copper it withholds more current thus it solves grid problems.

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