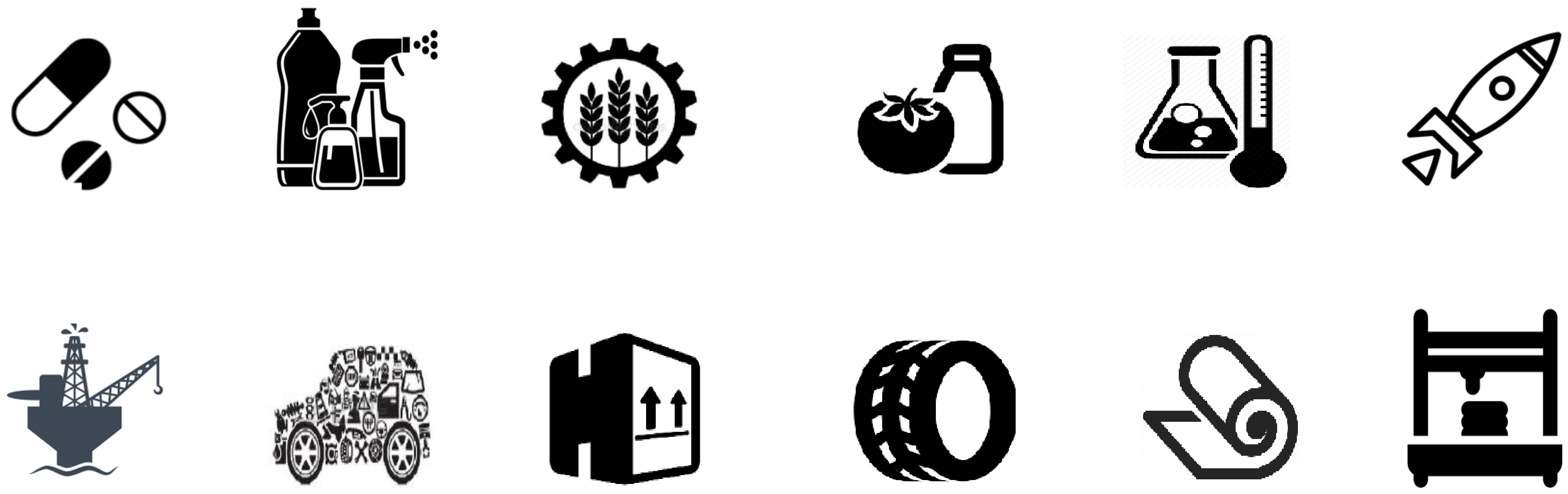

KERONE

Complete Engineering Solutions...

About KERONE

KERONE is one of the most admired and valuable company for customer satisfaction.

KERONE is pioneer in application and implementation engineering.

KERONE is possessing experience of 48+ years in engineering excellence.

KERONE has reported annual revenue of $18 to $20 Million , increasing year-on-year.

KERONE is having immense expertise in manufacturing and implementing various types of engineering solutions.

KERONE is possessing employee strength of more than 280 experts continuously putting efforts for happy industrial engineering solutions.

Our Vision and Mission

- Vision

  - Turn into world leader in providing specialized, top-notch quality and ecologically sustainable industrial heating, cooling , drying and engineering solution across the globe.
  - To attain global recognition as best of quality and environment friendly engineering solution company.

Mission

- To enhance the value of customer operation through our customer need centric engineering solution.
- We are committed to provide our customers, unique and best in class products in Industrial heating, drying and cooling segment, with strategic tie-up for the technical know-how with renowned leader in the industry specific segment.
- We are company that believes in strong ethics and timely commitment helps to build long term relationship.

Value Propositions

Highly
Customized Product

Sound
Infrastructure

Adherence
to
Standards

Timely
Delivery

Team of experts
Delivering Quality

Cost Effective
Solutions

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Recognized and Rated by CRISIL	CRISIL Verified	Member of A.M.P.E.R.E. (Europe)	ASCB(E) Certification for Best practice

We are Certified by...

ROHS	VDE	CE	BIS	UL

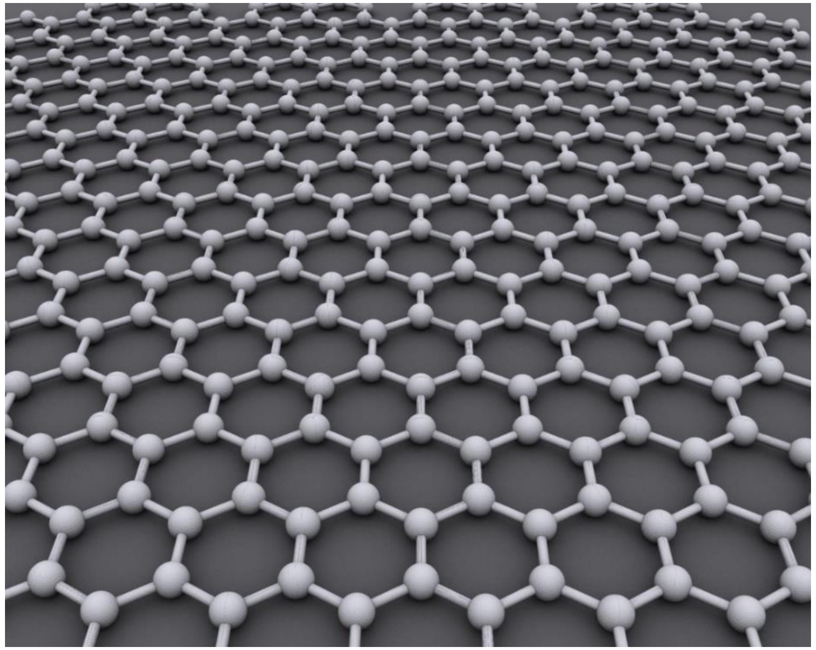
ISO 9001:2008 | ISO 9001:2015 | OHSAS 18001 | EMS 14001

Graphene From Biochar Or Coffee Biochar

What is Graphene?

Graphene is an allotrope of carbon consisting of a single layer of atoms arranged in a hexagonal lattice nanostructure. The name is derived from "graphite", reflecting the fact that the graphite allotrope of carbon contains numerous double bonds.

Graphene has become a valuable and useful nanomaterial due to its exceptionally high tensile strength, electrical conductivity, transparency, and being the thinnest two-dimensional material in the world. The global market for graphene was $9 million in 2012, with most of the demand from research and development in semiconductor, electronics, electric batteries, and composites.
The IUPAC (International Union for Pure and Applied Chemistry) recommends use of the name "graphite" for the three-dimensional material, and "graphene" only when the reactions, structural relations, or other properties of individual layers are discussed.
A narrower definition, of "isolated or free-standing graphene" requires that the layer be sufficiently isolated from its environment, but would include layers suspended or transferred to silicon dioxide or silicon carbide.



What is Biochar?

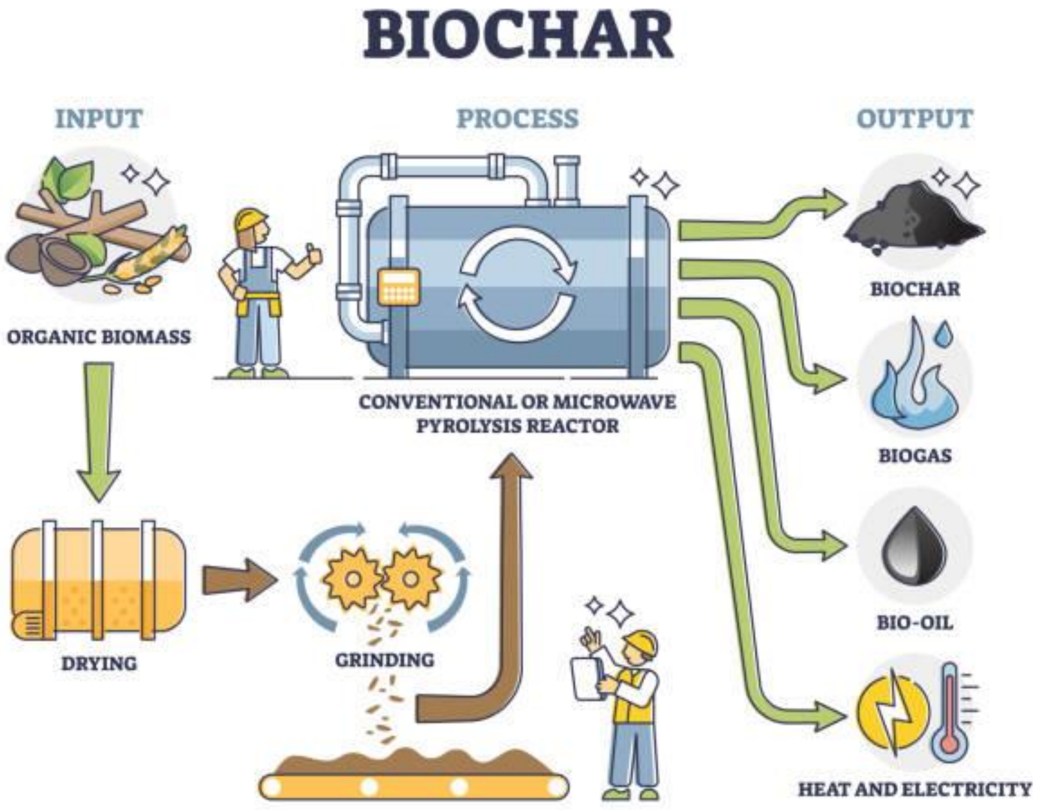
Biomass is a sustainable and rich source of carbon production. For the proficient utilization of carbon resources, it is necessary to understand the carbon chemistry and factors influencing its properties. This review highlighted the novel research on different sources specially from biomass derived several synthetic schemes for the preparation of graphene including 3D graphene-based materials, advanced characterization techniques and their application for energy generation, storage, sensing, biomedical fields.

1. Identification of synthesis techniques for the development of graphene from various sources including graphite, non-graphite sources specially from graphene synthesis from bio-mass sources.
2. Synthesis techniques of graphene quantum dots (GQDs) from various biomass sources and biomass-wastes.
3. Advanced material analysis and characterization techniques to understand the structural, surface and optical. behaviors of graphene as well as electrical, thermal parameters, microwave properties.
4. Finally, multidimensional real-world applications for graphene.

Benefits of Biochar

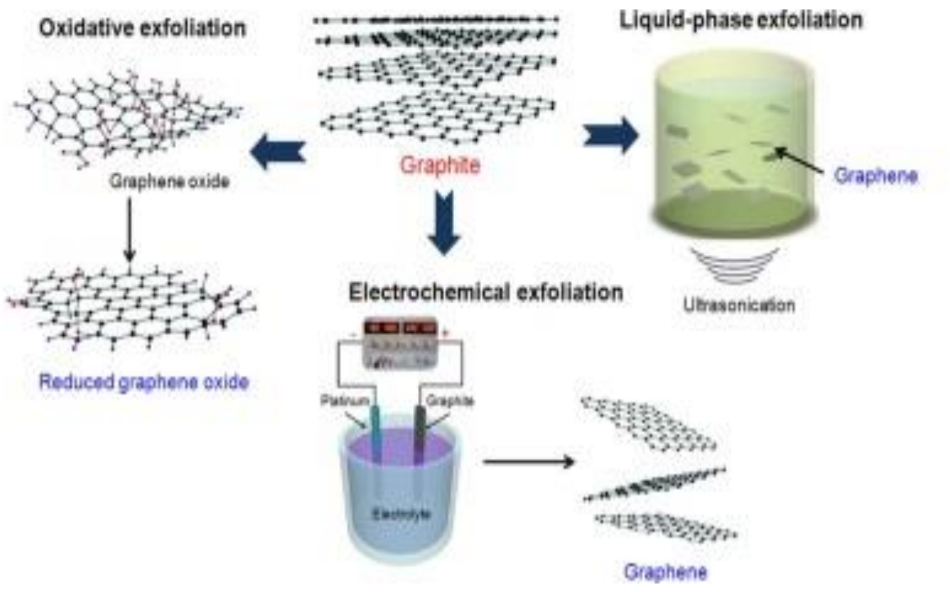
Burning biomass in low-oxygen conditions creates biochar, a carbon-rich substance that some experts tout as the key to soil rejuvenation. Relatively light-weight and porous, biochar can act like a sponge and serve as a habitat for many beneficial soil microorganisms that are known to promote soil and plant health.

The raw material base used and the temperature that the material was heated to changes the chemical composition of biochar. The impacts of biochar depend on variables like these, so users can customize it to better match the soil's needs.



What is Graphene Exfoliation System ?

Liquid-phase exfoliation of graphite oxide is the most widely used method for the preparation of graphene. In this method, the graphite is intercalated with strong oxidizing agents [53,54,56], followed by graphite layers’ expansion via sonication. The reduction of the obtained graphene oxide to graphene is usually conducted by either thermal or chemical approaches

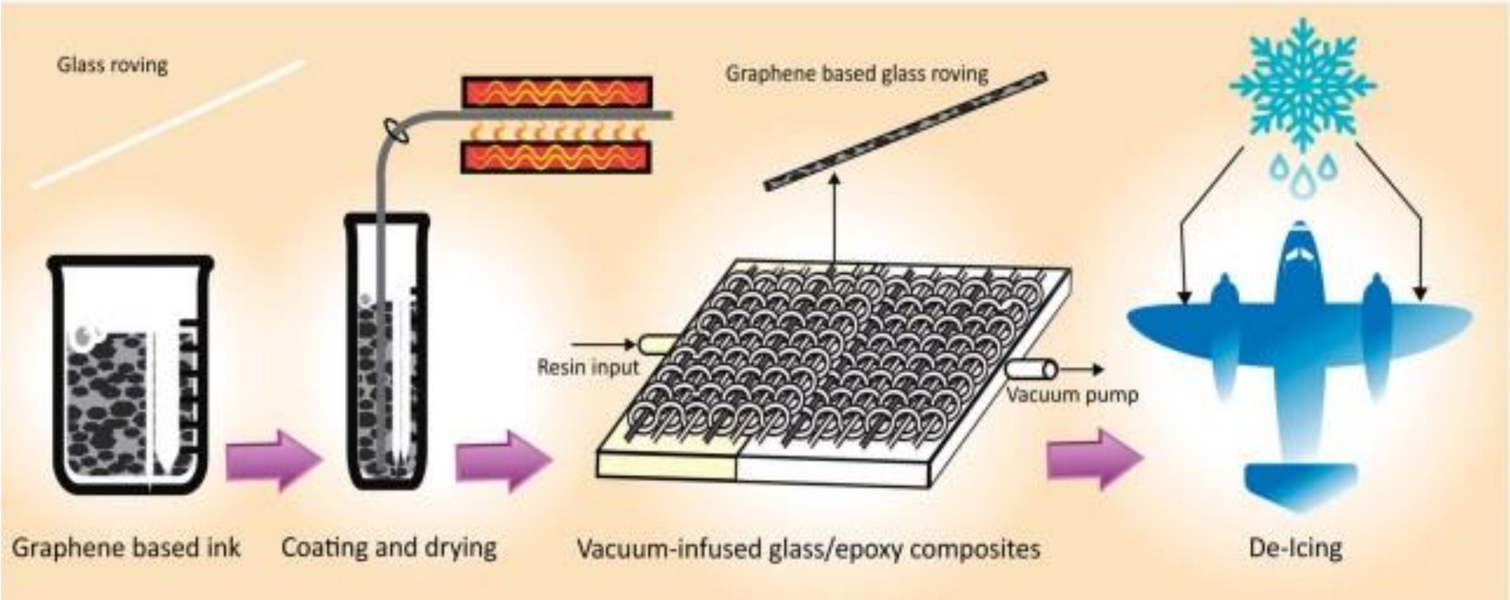


Graphical abstract

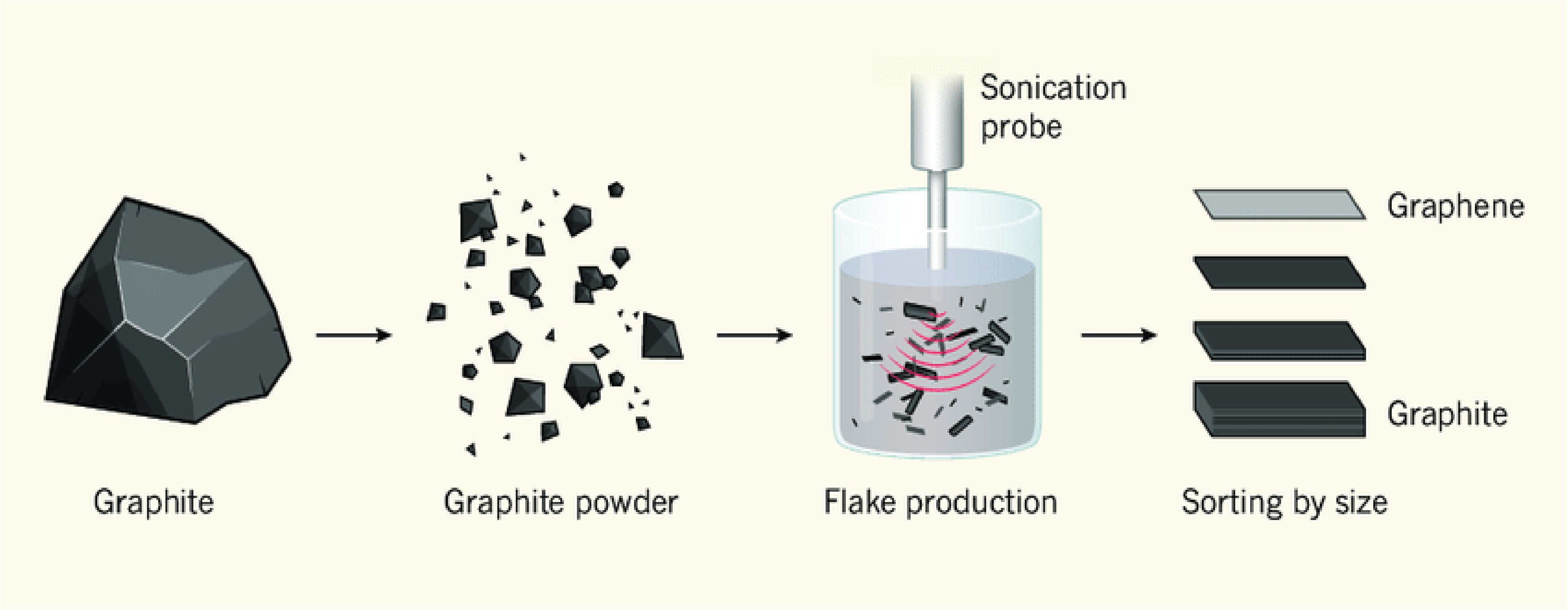
Uses And Application of Graphene

The scientific community is keeping its eyes on graphene, as it could completely change the way we relate to technology. And not just that, it could also represent significant advances in different sectors.

- Graphene in electronics
- Graphene in health
- Graphene in construction
- Graphene in energy sector



Origination of Graphene



Structure of graphite and its intercalation compounds:

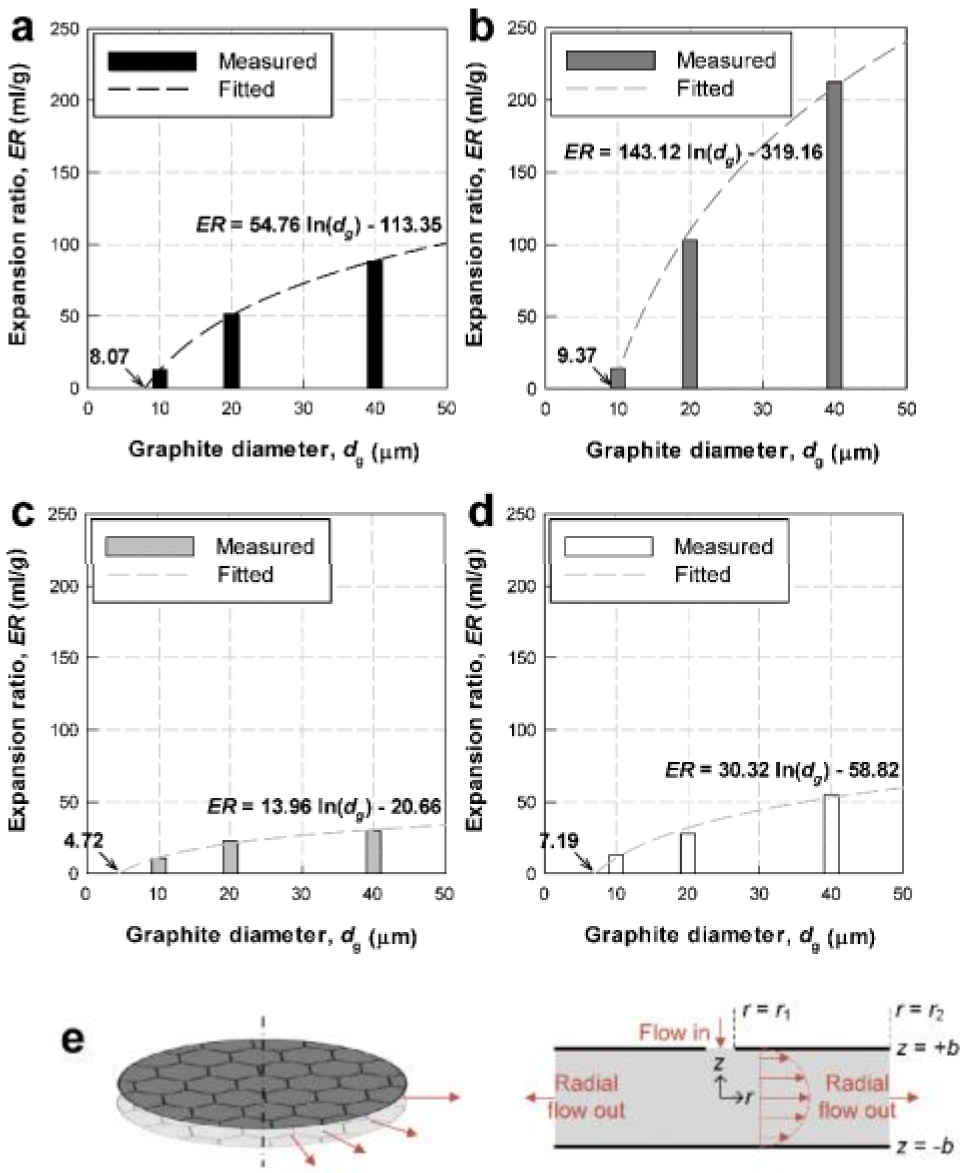
In 1859, Benjamin Brodie noted the highly lamellar structure of thermally reduced graphite oxide. In 1916, Peter Debye and Paul Scherer determined the structure of graphite by powder X-ray diffraction. The structure was studied in more detail by V. Kohlschütter and P. Haenni in 1918, who also described the properties of graphite oxide paper. Its structure was determined from single-crystal diffraction in 1924.

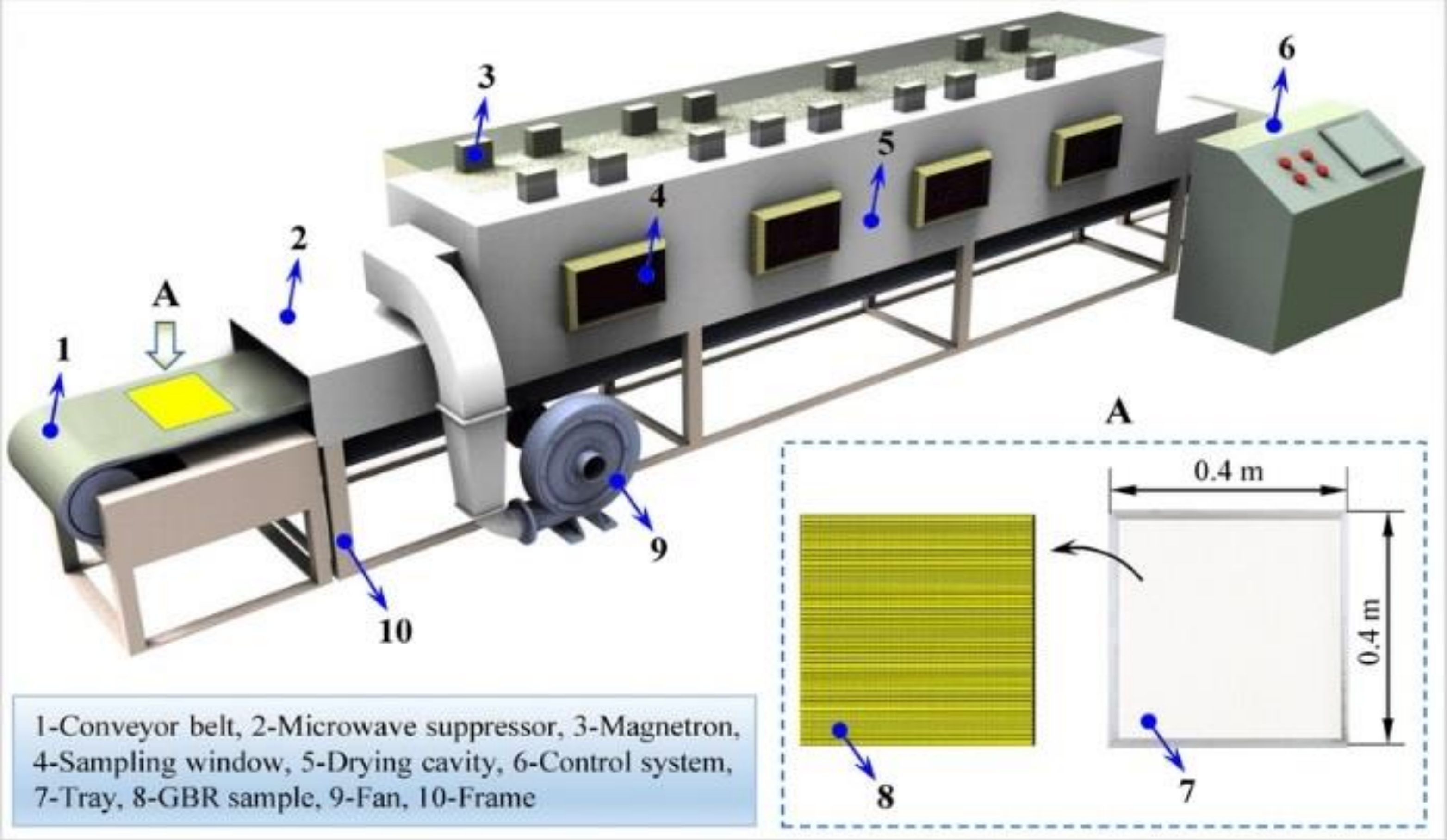
The theory of graphene was first explored by P. R. Wallace in 1947 as a starting point for understanding the electronic properties of 3D graphite. The emergent massless Dirac equation was first pointed out in 1984 separately by Gordon Walter Semenoff, and by David P. DiVincenzo and Eugene J. Mele. Semenoff emphasized the occurrence in a magnetic field of an electronic Landau level precisely at the Dirac point. This level is responsible for the anomalous integer quantum Hall effect.

Graphite Form

We characterized the dependence of ER on the form (natural vs. synthetic), type (lump vs. flake), and size (10 to 40 μm in diameter) of graphite. The expansion capacity of graphite in the microwave-assisted exfoliation was specific to certain forms and types of graphite and differences in particle size: natural graphite achieved about 4.3 times larger ER than synthetic one; flake-type graphite showed about 2.4 times larger expansion capacity than lumptype one; large graphite had higher ER than small one. The first phenomenon related to graphite form can be explained by the physical fact that natural graphite exhibits a much higher crystalline structure than synthetic one; the second is because flake-type graphite has more open areas (or spaces) for intercalation and exfoliation than lump-type one with the highest degree of cohesive integrity. The last but not least phenomenon can be understood by constructing a fluiddynamics-based model. The main assumption of this model is that the expansion of graphite by microwave irradiation is due to the pressure exerted by an accumulating gas from the expansion of intercalation agent. Thus, we model the exfoliation of graphite as a steady, laminar flow occurred in the space between two fixed parallel and circular plates

$$ER \sim R_f = \frac{3\mu \ln(r_2 / r_1)}{4\pi b^3 \rho} = C_1 \ln r_2 + C_2,$$


a
Measured
Fitted
ER = 54.76 ln(d_g) - 113.35
8.07
Expansion ratio, ER (ml/g)
Graphite diameter, d_g (μm)
b
Measured
Fitted
ER = 143.12 ln(d_g) - 319.16
9.37
Expansion ratio, ER (ml/g)
Graphite diameter, d_g (μm)
c
Measured
Fitted
ER = 13.96 ln(d_g) - 20.66
4.72
Expansion ratio, ER (ml/g)
Graphite diameter, d_g (μm)
d
Measured
Fitted
ER = 30.32 ln(d_g) - 58.82
7.19
Expansion ratio, ER (ml/g)
Graphite diameter, d_g (μm)
e
Flow in
$r = r_1$
$r = r_2$
$z = +b$
$z = -b$
Radial flow out
Radial flow out


1
A
2
3
4
5
6
9
10
A
0.4 m
0.4 m
8
7
1-Conveyor belt, 2-Microwave suppressor, 3-Magnetron, 4-Sampling window, 5-Drying cavity, 6-Control system, 7-Tray, 8-GBR sample, 9-Fan, 10-Frame

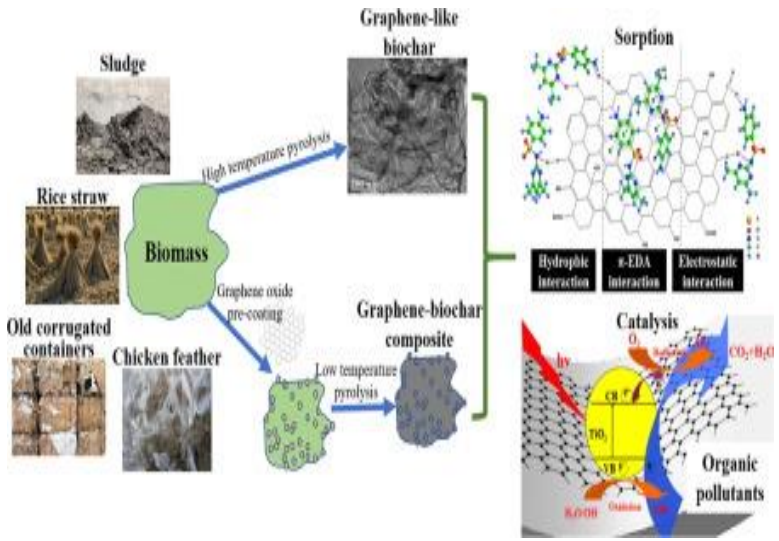
Graphene from agricultural waste

Biochar into graphene can have many uses, like replacing activated carbon coatings of electrodes used in super capacitors. Graphene has a much higher monetary value than the plant products in this process, so it can be highly worthwhile to turn these agricultural residues into graphene.

Once the plant substance is transformed to biochar, it is mixed with a chemical that functions as a catalyst with the biochar and heats the mixture to 1,292 degrees Fahrenheit for one hour to make porous graphene. The scientists also hope to adapt a new plasma processing technique developed at SDSU that reduces the processing time to five minutes and the temperature to 302 degrees Fahrenheit to convert biochar to graphene.

BIOMASS CONVERSION TO GRAPHENE

The process of biomass conversion to graphene requires concentrating the carbon content. This process has been used by industries to produce bio-char. Biomass utilization is based on thermal treatment such as gasification, carbonization, liquefaction, and pyrolysis to produce bio-oils, bio-gas, biochemical, or bio-char. The process of increasing the carbon content by removing other elements through thermal treatment is called carbonization; the process of arranging the carbon structures to produce a graphitic-like structure is called graphitization.



Soft carbon can easily be converted into graphite with thermal treatment. Even though some may consider that the converted carbon structures are not pure graphene due to the number of other carbon materials, the properties that they possessed are somewhat graphene-like. The amount of amorphous carbon correlates to that of exceeding the reaction time and an excessive amount of carbon sample during the thermal treatment.

Biomass Thermal Treatment For Graphene

The term carbonization is often used in the context of converting biomass into carbon-related materials. Carbonization is a process in which the subjected material undergoes a heating process to remove light molecular weight compounds.

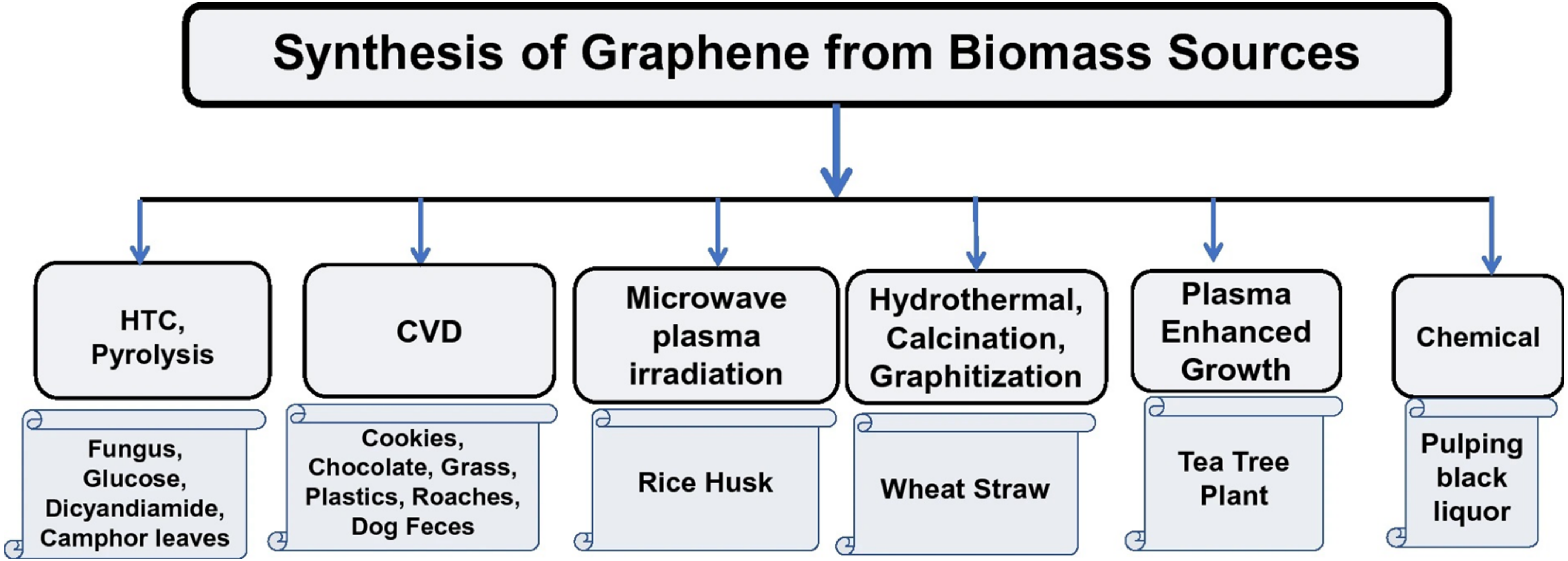
The graphitization process affects the structure of the carbon-material into a graphite-like structure. A thermal carbonization process in the absence of oxygen also known as pyrolysis. It is a well-known process for converting biomass into bio-char, bio-oil, bio-gas, *etc*. The product depends on the parameters set during pyrolysis, including the temperature, heating rate, and holding time.

The difference in temperature might reflect the inorganic silica compounds in the rice husk Most pyrolysis of rice husk requires a mixture with potassium hydroxide to release the silica entrapped within the structure. In both cases, the carbonization temperature was set for the decomposition of lignin, as it holds the most carbon linkages of the lignocellulose components.

Synthesis of Graphene from Biomass Sources

High-quality graphene can be formed using catalyst metal foil. The cost-effective, mass production of graphene can be formed using the biomass resource and waster materials.

The usage of biomass resource and waste materials as carbon sources is a promising method that results in a cost-effective, mass production of graphene. However, it is difficult to synthesize large amounts of graphene using a catalyst. Additionally, when plants and waste materials are used as a carbon source without using a catalyst, problems such as low quality and high defects might exist.



Graphene from Biomass waste:

Turning biochar into graphene can have many uses, like replacing activated carbon coatings of electrodes used in supercapacitors. Graphene has a much higher monetary value than the plant products in this process, so it can be highly worhtwhile to turn these agricultural residues into graphene.

Formation of Graphene from Coffee Biochar?

Biochar has been made by carbonization of spent coffee grounds without further activation and has been characterized by several techniques revealing a material with a satisfactory balance of micro porosity with meso and macro porosity. The material was fairly pure with 96% of its mass made of carbon and oxygen, 2.2% of K and the rest of unidentified minerals. This biochar was used to make a super capacitor electrode combined with a photo catalytic fuel cell as an electric power source. It has been shown that the present biochar does apply as material to make a super capacitor with specific capacitance mounting up to 200

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