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Nanotechnologies - Vocabulary - Part 14: Graphdiyne

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 14 of GB/T 30544 "Nanotechnology Terminology". GB/T 30544 has published the following parts.

- Part 1: Core terminology;
- Part 3: Carbon nanomaterials;
- Part 4: Nanostructured materials;
- Part 5: Nano/bio interface;
- Part 6: Characterization of nano-objects;
- Part 7: Nanomedicine diagnosis and therapy;
- Part 8: Nanomanufacturing processes;
- Part 12.Quantum phenomena in nanotechnology;
- Part 13.Graphene and related two-dimensional materials;
- Part 14.Glydene.

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document was proposed by the Chinese Academy of Sciences.

This document is under the jurisdiction of the Nanomaterials Subcommittee of the National Nanotechnology Standardization Technical Committee (SAC/TC279/SC1).

This document was drafted by: Institute of Chemistry, Chinese Academy of Sciences, Beijing Academy of Science and Technology, Beijing Normal University, Metallurgical Industry Information Standards Quasi-research institute.

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Introduction

Carbon material research is one of the most active areas in materials science. Carbon has three hybrid states. sp3, sp2 and sp.

Hybridization can form a variety of carbon allotropes, for example, diamond can be formed through sp3 hybridization, and To form carbon nanotubes, fullerenes and graphene, etc., through sp and sp2 hybridization can Graphdiyne is formed, as shown in FIG1.

GDY is a new carbon allotrope. Since it was first successfully synthesized in 2010, it has attracted the attention of researchers from chemistry, physics, Scientists in the fields of materials, biology, electronics and semiconductors are studying it. Through methods such as doping, substitution and compounding, graphene can be The structure and properties of Graphdene can be further regulated to achieve a wider range of applications.

The unique nano-scale pores, two-dimensional layered conjugated skeleton structure and semiconductor properties make it widely used in energy, electrochemistry, catalysis, optics, electronics, etc.

It has significant advantages in many fields such as science, biology, and information. Figure 2 provides a framework of graphyne and related substances.

At present, many important achievements have been made in the basic and applied research of graphyne. The number of publications, patents, products, etc. related to graphyne is increasing.

The amount of graphyne has increased rapidly, and it has become an important research field of carbon materials. In order to promote the research, development, application and communication of graphyne, it is necessary to To unify terms and definitions.

a) Diamond b) Graphite c) Fullerene

d) Carbon nanotubes e) Graphene f) Glydyne Figure 1 Carbon allotropes Books, Books, Books China has established a basic national standard system for terminology in the field of nanotechnology. GB/T 30544 is planned to consist of 14 parts. constitute.

- Part 1: Core terminology. The purpose is to define the basic terminology in the field of

nanotechnology.

- Part 2: Nano-objects. The purpose is to define the terminology of nano-objects.

- Part 3: Carbon nano-objects. The purpose is to define the terminology of carbon nano-objects.

- Part 4: Nanostructured Materials. The purpose is to define the terms related to nanostructured materials.

- Part 5: Nano/bio interface. The purpose is to define the terminology of nano/bio interface.

- Part 6: Characterization of nano-objects. The purpose is to define the terms for the characterization of nano-objects.

- Part 7: Nanomedicine diagnosis and therapy. The purpose is to define the terms of nanomedicine diagnosis and therapy.

- Part 8: Nanomanufacturing processes. The purpose is to define the terminology of nanomanufacturing processes.

- Part 9: Nano-electrotechnical products. The purpose is to define the terminology of nano-electrotechnical products.

- Part 10.Nanophotonic devices. The purpose is to define the terminology of nanophotonic devices.

- Part 11.Nanolayers, nanocoatings, nanofilms and related terms. The purpose is to define nanolayers, nanocoatings, nanofilms and related terms. Thin films and related terms.

- Part 12.Quantum phenomena in nanotechnology. The purpose is to define the terminology of quantum phenomena in nanotechnology.

- Part 13.Graphene and related two-dimensional materials. The purpose is to define the terms for graphene and related two-dimensional materials.

- Part 14.Glydene. The purpose is to define glydene and related terms.

Nanotechnology Terminology Part 14.Graphdiyne

1 Scope

This document defines the terms and definitions related to graphyne in the field of nanotechnology.

This document is applicable to the mutual cooperation among the industry, government organizations, social persons and other relevant parties in the research and industrialization process of graphyne. comminicate.

2 Normative references

This document has no normative references.

3.1.1.1 Graphdiyne; GDY

Graphdiyne Contains sp and sp2 hybridized carbon atoms, and the adjacent benzene rings are connected by diacetylene bonds to form a planar network structure of carbon atoms.

The structure of the isomorph is shown in Figure 3.

Note. The physical properties of graphyne are closely related to the number of layers and the stacking mode between layers.

a) Schematic diagram of the layered structure of graphyne. b) Graphene molecular structure.

Figure 3 Structure of graphyne

3.1.1.2 graphdiynederivative

New compounds that retain the basic skeleton of graphyne (3.1.1.1) and are obtained through substitution, doping or acetylenic bond reaction.

Note. The nomenclature of carbon-substituted graphyne derivatives is given in Appendix A.