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Nanotechnologies - Determination of specific surface area of graphene materials - Methylene blue adsorption method

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Foreword

This guidance technical document was drafted in accordance with the rules given in GB/T 1.1-2009. This guidance technical document was proposed by the Chinese Academy of Sciences. This guidance document is organized by the National Nanotechnology Standardization Technical Committee Nanomaterials Subcommittee (SAC/TC279/SC1) Return to the mouth. This guiding technical document was drafted by: Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo Moxi Technology Co., Ltd. Jin Industrial Information Standards Institute, Jinan Shengquan Group Co., Ltd., Ningbo Graphene Innovation Center Co., Ltd. The main drafters of this guiding technical document. Liu Zhaoping, Zhou Xufeng, Lu Huanming, Qin Zhihong, Hou Huining, Zheng Yingfu, Zhang Gongjun, Zhao Yongsheng, Wu Tingting, Zhang Xiumei.

Graphene materials have a large specific surface area and are widely used in energy, chemical and environmental protection fields such as energy storage, catalysis, sensing and water treatment. Do not The specific surface area of the graphene material prepared by the same method is greatly different, and the specific surface area of the graphene material is accurately determined. Important role. This guidance document uses graphene materials to adsorb methylene blue in the liquid phase, and absorbance of the methylene blue solution before and after adsorption. Change to calculate the specific surface area of the graphene material. The surface structure and physical and chemical properties of graphene materials prepared by different methods are different in solvents. There are also large differences in the dispersion behavior; secondly, the adsorption behavior of methylene blue on the surface of graphene sheets is affected by temperature, time and adsorption. Degree and the amount of graphene added, the monolithic dispersion state of the graphene material in the adsorption system and the surface of the methylene blue on the graphene material The adsorption state has a great influence on the test method. This guidance technical document can be used as a reference for testing the specific surface area of graphene materials. Nanotechnology graphene material specific surface area test Methylene blue adsorption

1 Scope

GB/Z 38062-2019 is the Chinese national standard on nanotechnologies - determination of

specific surface area of graphene materials - methylene blue adsorption method, in the field of chemical technology. The /Z suffix marks it as a guiding technical document: it does not prescribe requirements that can be certified against, but sets out the technique, the method or the state of the art that the standards bodies recommend following. It was issued on 18 October 2019 by the State Administration for Market Regulation; Standardization Administration of China. As a guiding technical document it carries no separate date of entry into force: it applies from publication. Classification: ICS 71.040, CCS A20. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This guidance document specifies the definitions, principles, instruments, and reagents involved in testing the specific surface area of graphene using methylene blue adsorption. Sample preparation, test procedures, analytical procedures, results calculations, and test reports. This guidance document applies to the specific surface area of graphene materials prepared by thermal stripping of graphite oxide, chemical intercalation and mechanical exfoliation. Test.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article. Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 6682-2008 Analytical laboratory water specifications and test methods

GB/T 8170 Numerical Rounding Rules and Representation and Determination of Limit Values

GB/T 12806-2011 laboratory glass instrument single standard line volumetric flask

GB/T 12807-1991 Laboratory glass instrument indexing pipette

GB/T 15724 laboratory glassware beaker

GB/T 15725.6 laboratory glass instrument grinding flask

GB/T 30544.13 Nanotechnology terminology - Part 13. Graphene and related two-dimensional materials

3 Terms and definitions

The following terms and definitions as defined in GB/T 30544.13 apply to this document. For ease of use, the following is repeated Certain terms and definitions in GB/T 30544.13.

3.1 Specific surface area specificsurfacearea Surface area of solid mass per unit mass.

[GB/T 19587-2017, definition 3.11]

3.2 Graphite oxide thermal stripping thermalexfoliationofgraphiteoxide Introducing an oxygen-containing functional group between the graphene layers of graphite, heating and decomposing the introduced chemical substances and units, generating gas, and peeling off A layer of the original graphene oxide to prepare a method for reducing graphene oxide.

Note. Thermal stripping and reduction of graphite oxide occur simultaneously. [GB/T 30544.13-2018, definition 3.2.1.17]

3.3 Chemical intercalation exfoliationviachemicalintercalation < two-dimensional material> by inserting chemicals and units between the layers of a thicker layered material, and then immersing them in a liquid, using mechanical energy or