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Carbon based films - Classification and designations

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. This document is equivalent to ISO 20523:2017 "Classification and Nomenclature of Carbon-Based Films". Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents. This document is proposed by China Machinery Industry Federation. This document is under the jurisdiction of the National Standardization Technical Committee for Metallic and Non-metallic Coverings (SAC/TC57). This document was drafted by: Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Wuhan Institute of Materials Protection Co., Ltd., Ningbo New Materials Testing and Evaluation Center Co., Ltd., Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Institute of New Materials, Guangdong Academy of Sciences, China Mining University, Dongguan Huasheng Vacuum Coating Technology Co., Ltd. The main drafters of this document. Wang Aiyong, Duan Haitao, Guo Peng, Ke Peiling, Xie Kaifeng, Wang Peng, Chai Liqiang, Lin Songsheng, Shi Qian, Li Xiaowei, Lin Haitian. Classification and naming of carbon-based films

1 Scope

GB/T 43104-2023 classifies and names carbon based films. Carbon deposits as a coating in a range of forms that share nothing but the element - graphitic, tetrahedral amorphous,

hydrogenated amorphous, polymer-like, doped with silicon or metals, or crystalline diamond - and their hardness, friction and electrical behaviour differ by orders of magnitude. Industry has called almost all of them DLC, which tells a purchaser nothing about what they are buying. The standard fixes the vocabulary: the deposition processes, the categories with the main carbon film types, the classification criteria based on the bonding and hydrogen content, the film structure, and the classification table with the resulting designations. It took effect on 1 April 2024.

This document specifies the classification, naming and abbreviation of carbon-based films. The carbon-based film described in this document uses carbon as its main component and is composed of physical Thin films prepared by vapor deposition (PVD) or chemical vapor deposition (CVD). Carbon-based films include amorphous carbon-based films [also known as diamond-like films] diamond film (DLC)], CVD diamond film, graphite film and polymer-like carbon-based film. This document applies to carbon-based films produced on an industrial scale. This document does not apply to the remaining types of carbon-based products that have not yet been produced on an industrial scale film. This document only covers carbon-based film materials and does not involve composite coatings composed of main functional layers and upper/lower additional layers. A film in which the composition and/or properties of each layer in the film changes with thickness is called a gradient film. The carbon-based films mentioned in this document refer to non-gradient film. Carbon-based films may contain elements such as hydrogen, metals or other elements. The metal component also includes metal carbides. Doping covered by this document Carbon-based films only include film systems with carbon as the main component. It is also not applicable to carbon-based films where carbon exists in the form of carbides. The metal-doped amorphous carbon-based thin film (aC.Me, aC.H.Me) system in this document. This document does not apply to carbon materials such as fullerene, carbon nanotubes, graphene, and graphyne.

2 Normative reference documents

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document. Terminology data used in standardization work maintained by ISO and IEC are available at the following URLs.

3.1 substrate Workpiece or material used for thin film deposition.

3.2 Nanocrystalline Along the film growth surface, the grain size is polycrystalline between 1nm and 500nm.

3.3 microcrystalline Along the film growth plane, the grain size is polycrystalline between 0.5µm and 10µm.

4 Abbreviations

The following abbreviations apply to this document.

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