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Nanotechnologies - Vocabulary - Nanozyme

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Foreword

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1. Structure and Drafting Rules of Standardization Documents" Drafting. 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 the Chinese Academy of Sciences. This document is under the jurisdiction of the National Nanotechnology Standardization Technical Committee (SAC/TC279). This document was drafted by: Institute of Biophysics, Chinese Academy of Sciences, Southeast University, Institute of Basic Medicine, Chinese Academy of Medical Sciences, Beijing Institute of Technology University of Technology, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Nanjing University, Nanjing Donna Biotechnology Co., Ltd., Beijing Namimei Technology Co., Ltd. Company, Gill Biotechnology (Tianjin) Co., Ltd., Chongqing Kangjuquanhong Biotechnology Co., Ltd., Zhengzhou University, Shenzhen Second People's Hospital (Shenzhen Institute of Translational Medicine), Nankai University, and Northwestern Polytechnical University. The main drafters of this document. Yan Xiyun, Wang Erkang, Gu Ning, Xu Haiyan, Liang Minmin, Zhang Yu, Gao Lizeng, Wei Hui, Wen Tao, Qu Xiaogang, Fan Kelong, Duan Demin, Ding Hui, Huang Xinglu, Jiang Bing, Zhang Lianbing.

Enzymes are biological catalysts, mainly including proteins, ribonucleic acid (RNA) or their complexes, which can catalyze specific chemical reactions and are used in industrial production. It has important application value in industrial, medical, environmental management and other fields. With the development of nanotechnology and the deepening of research in the cross-field of nanobiomedicine, people have found that many nanomaterials can The substrates of catalytic enzymes and the biochemical reactions mediated by them under and conditions show similar reaction kinetics and catalytic mechanisms, and the catalytic activity is similar to that of Factors such as the size,

composition, structure and surface modification of nanomaterials are closely related and exhibit a unique type of nanoeffects. of this nature Nanomaterials are called nanozymes. The proposal of this terminology system is conducive to standardizing the research, development and evaluation of nanozyme-related technologies and products, making it easier for researchers with different subject backgrounds and fields to It can help development and production personnel form a unified understanding and understanding; at the same time, it is also conducive to academic research, standard formulation, technology transformation and product research and development, etc. Nanotechnology term nanozyme

1 Scope

GB/T 42739-2023 defines the vocabulary of nanozymes - nanomaterials that catalyse reactions the way enzymes do. They are attractive precisely because they are not enzymes: they are cheap to make, they survive heat and pH that would denature a protein, and they can be stored indefinitely, which is why they have moved quickly into biosensing, diagnostic assays, antibacterial materials and environmental treatment. The field sits between nanotechnology and enzymology, and it inherited terminology from both, along with the habit of describing a nanomaterial's activity in enzyme language without always meaning the same thing by it - catalytic activity, specificity, kinetics and the naming of a nanozyme by the enzyme it mimics all carry assumptions that need stating. This document defines the terms and definitions relevant to nanozymes across nanotechnology and enzymology. It is intended for teaching, scientific research, the writing of technical documents, books and periodicals, and technical exchange in the nanotechnology field. Under ICS 07.120 and CCS L04, it is aimed at research groups, materials and diagnostics developers, and the editors and translators who have to keep a fast-moving literature consistent.

This document defines the terms and definitions relevant to nanozymes in the fields of nanotechnology and enzymology. This document is suitable for teaching, scientific research, writing technical documents, books and periodicals, and technical exchanges in the field of nanotechnology.

2 Normative reference documents

This document has no normative references.

3.1.1 Nanoscale In the size range between 1nm and 100nm. NOTE

1.This size range generally, but not exclusively, exhibits characteristics that cannot be extrapolated from larger sizes. For these properties, the upper and lower limits of the scale is approximate. Note

2.The purpose of introducing a lower limit (approximately 1nm) in this definition is to avoid a

single atom or a small cluster of atoms being defaulted to a nanometer object or object when a lower limit is not set. Nanostructured units. [Source: GB/T 30544.1-2014,2.1]

3.1.2 nanomaterial nanomaterial Materials with any external dimension, internal or surface structure at the nanoscale (3.1.1). [Source: GB/T 30544.1-2014,2.4]

3.1.3 enzymeenzyme A biological catalyst that is composed of proteins, ribonucleic acid (RNA) or their complexes and can catalyze specific chemical reactions.

Note. Enzymes speed up the reaction rate by reducing the activation energy of the reaction, but do not change the equilibrium point of the reaction. The functions of enzymes are characterized by high efficiency, strong specificity, and reactive Conditions are mild.

3.2 Terminology to describe nanozymes

3.2.1 nanozyme Nanomaterials with similar enzymatic catalytic activity and enzymatic reaction kinetic characteristics (3.1.2). Note

1.Nanozymes (3.2.1) are mainly artificially synthesized nanomaterials (3.1.2), and also include some naturally derived nanomaterials (3.1.2), such as magnetosomes and iron eggs. Wait, see Appendix A for specific naming rules. Note

2.The catalytic reaction of nanozyme (3.2.1) usually follows the Michaelis-Menten equation. The reaction kinetic constants include. nanozyme Michaelis-Menten constant (3.2.8), nanozyme catalytic constant number (3.2.9), nanozyme catalytic efficiency index (3.2.10).