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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Ytterbium silicate powder for rare earth environmental barrier
coatings**

稀土环境障涂层材料 硅酸镱粉末

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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 is required. 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 and coordinated by the National Rare Earth Standardization Technical Committee (SAC/TC 229). This document was drafted by: Resource Utilization and Rare Earth Development Institute of Guangdong Academy of Sciences, New Materials Institute of Guangdong Academy of Sciences, Guangdong Industrial Analysis and Testing Center of the Academy of Sciences, State-owned Sichuan West Machinery Factory, Youyan Rare Earth High-Tech Co., Ltd., Xi'an Jiaotong University, Guangdong Yueke Xinfu New Materials Co., Ltd., Beikuang New Materials Technology Co., Ltd., Baotou Rare Earth Research Institute, Youyan Resources and Environmental Technology Research Institute (Beijing) Co., Ltd. Co., Ltd., Ruike Rare Earth Metallurgy and Functional Materials National Engineering Research Center Co., Ltd., and Ganzhou Rare Earth Mining Co., Ltd. The main drafters of this document are: Ni Haiyong, Ding Jianhong, Zhang Xiaofeng, Deng Chunming, Zhang Yongjin, Zhang Qihong, Tan Xi, Guo Shuangquan, Xu Huibing, Yang Guanjin, Zhang Deming, Jiang Wei, Bai Xue, Li Xubo, Liang Zhiyong, Pang Xiaoxiao, Wang Xingqi, Lu Fei, Li Jianping, Dong Lin, Zhang Shuai, Zhong Xiangxi, and Wu Yuchun. Rare Earth Environmental Barrier Coating Material Ytterbium Silicate Powder

1 Scope

China's national standard for ytterbium silicate powder used in rare earth environmental barrier coatings. Ceramic matrix composites - silicon carbide fibre in a silicon carbide matrix - are the material that lets a turbine's hot section run several hundred degrees hotter than a nickel superalloy while weighing a third as much, and they are entering production engines. They have one fatal weakness: in the combustion environment, silicon carbide's protective silica scale reacts with water vapour to form a volatile hydroxide and simply evaporates, receding at a rate that would consume a component in a few hundred hours. An environmental barrier coating is what stops that, and ytterbium silicate is the material of choice, because it resists the water-oxygen attack and its thermal expansion matches the composite closely enough to survive cycling. The standard specifies the powder's classification, technical requirements, test methods, inspection rules, marking, packaging, transport, storage and accompanying documents.

This document specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, and other requirements of ytterbium silicate powder for rare earth environmental barrier coatings. Requirements for packaging, transportation, storage and accompanying documents. This document is applicable to the use of ytterbium compounds and silicon compounds as raw materials, prepared by chemical methods, mainly used in the preparation of turbine engines in the aviation field Barrier coatings that

resist high-temperature water-oxygen corrosion environments are used for blades, combustion chambers and other components.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies. in this document.

GB/T 6682 Specifications and test methods for water used in analytical laboratories

GB/T 8170 Rules for rounding off values and expression and determination of limit values

GB/T 12690.2 Chemical analysis methods for non-rare earth impurities in rare earth metals and their oxides Part

2.Loss on ignition of rare earth oxides Gravimetric method GB T 12690.5-2017 Chemical analysis methods for non-rare earth impurities in rare earth metals and their oxides Part

5.Cobalt, manganese, lead, Determination of nickel, copper, zinc, aluminum, chromium, magnesium, cadmium, vanadium and iron

GB/T 12690.8-2021 Chemical analysis methods for non-rare earth impurities in rare earth metals and their oxides Part

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 particle size distribution coefficient Describes the powder particle size dispersion index. Calculate the powder particle size distribution coefficient (q) according to formula (1). $q = \frac{D_{90} - D_{10}}{D_{50}}$ (1) Where. D_{90} - the particle size corresponding to 90% of the powder in the volume cumulative distribution of particle size, in micrometers (μm); D_{10} - the particle size corresponding to 10% of the powder in the volume cumulative distribution of particle size, in micrometers (μm);

8 Determination of sodium content

GB/T 12690.9 Chemical analysis methods for non-rare earth impurities in rare earth metals and their oxides - Determination of chlorine content - Silver nitrate turbidimetric method

GB/T 14635-2020 Chemical analysis methods for rare earth metals and their compounds - Determination of total rare earth content

GB/T 18115.14-2010 Chemical analysis methods for rare earth impurities in rare earth

metals and their oxides Part

14.Lanthanum, ytterbium and Determination of the amount of cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, lutetium and yttrium

GB/T 20170.1-2006 Test methods for physical properties of rare earth metals and their compounds Determination of particle size distribution of rare earth compounds

GB/T 31057.1 Physical properties test of granular materials Part