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Gadolinium zirconate powder for high-temperature thermal barrier coatings

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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: Guangdong Academy of Sciences New Materials Research Institute, Guangdong Academy of Sciences Resource Utilization and Rare Earth Development Research Institute, Baotou Rare Earth Soil Research Institute, Guohe General Testing Evaluation and Certification Co., Ltd., Xi'an Jiaotong University, State-owned Sichuan West Machinery Factory, and Research Institute of Resources and Environmental Technology Institute (Beijing) Co., Ltd., Beikuang New Materials Technology Co., Ltd., Guangdong Yueke Xinfa New Materials Co., Ltd., Ruike Rare Earth Metallurgy and Functional Materials National Engineering Research Center Co., Ltd., Ganzhou Zhanhai New Materials Technology Co., Ltd., Ganzhou Rare Earth Mining Co., Ltd., Youyan Rare Earth High Technology Ltd. The main drafters of this document are. Zhang Xiaofeng, Tan Xi, Ni Haiyong, Ding Jianhong, Mao Jie, Deng Changguang, Lu Fei, Tian Jia, Liu Pengyu, Yang Guanjun, Liu Meijun, Chen Taili, Wang Xingming, Zhang Xin, Li Xubo, Li Hui, Gao Liang, Wu Yuchun, Zhong Xiangxi, Jiang Wei, Wang Juan, Peng Cheng, Peng Haoran, Zhang Qiuhong, Luo Wei and Xu Huibing. Rare earth thermal barrier coating material Gadolinium ytterbium zirconate powder

1 Scope

China's national standard for gadolinium zirconate powder for high temperature thermal barrier coatings. A thermal barrier coating lets a turbine blade run in gas hotter than the alloy's melting point, and for thirty years the coating has been yttria-stabilised zirconia. Its limit is around 1200 degrees C, above which it sinters and transforms and loses the porous structure that makes it insulating - and modern engines want to run hotter than that.

Gadolinium zirconate is the leading replacement: a pyrochlore with lower thermal conductivity than YSZ, stable to considerably higher temperature, and resistant to the molten dust deposits that attack YSZ. The standard covers powder made by chemical routes from ytterbium, gadolinium and zirconium or hafnium compounds for use on blades and combustion chambers of aviation turbine engines, specifying classification, technical requirements, test methods, inspection rules, marking, packaging, transport and storage.

This document specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, Transport, storage and accompanying documents. This document applies to ytterbium compounds, gadolinium compounds and zirconium (hafnium) compounds as raw materials, prepared by chemical method, for use in turbine engines in the aviation field. Gadolinium zirconate powder for high-temperature thermal barrier coatings for engine 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 to This document.

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.Ignition reduction in rare earth oxides Determination of quantity by gravimetric method

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

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 particle size distribution coefficient An index that describes the dispersion of powder particle size. Calculate the powder particle size distribution coefficient (q) according to formula (1). q = D 90 - D 10 D 50 (1) Where. D90 -- The particle size corresponding to 90% of the powder in the volume cumulative distribution of particle size, in micrometers (μm); D10 -- The particle size corresponding to 10% of the powder in the volume cumulative distribution of particle size, in micrometers (μm); D50 - The particle size corresponding to 50% of the powder in the volume cumulative distribution of particle size, in micrometers (μm).

3.2 Agglomerated powder The powder is obtained by spray drying, granulation, heat treatment and densification of the original powder.

4 Categories

4.1 Product Categories According to specifications, powder state and use, the products are divided into RETBCGYbZxYbOP1, RETBCGYbZxYbOP2, RETBC