

碳酸钙水泥：一种碳捕获、利用和储存（CCUS）技术

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摘要：

>40MPa

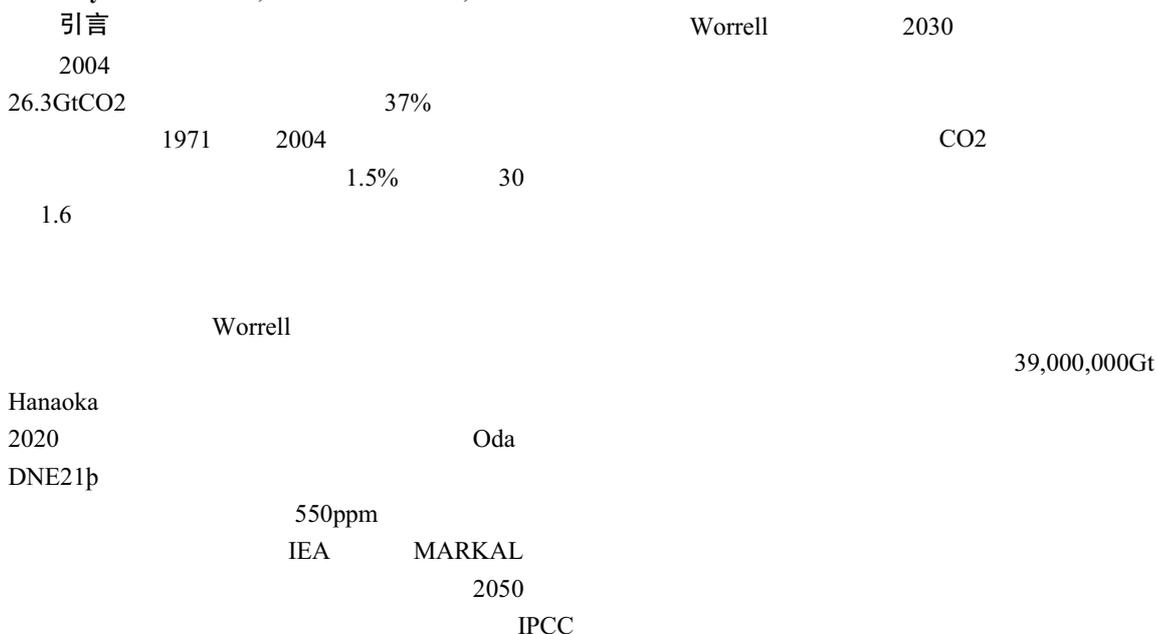
关键词：

Calcium Carbonate Cement: A Carbon Capture, Utilization, and Storage (CCUS) Technique

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Abstract:A novel calcium carbonate cement system that mimics the naturally occurring mineralization process of carbon dioxide to biogenic or geologic calcium carbonate deposits was developed utilizing carbon dioxide-containing flue gas and high-calcium industrial solid waste as raw materials. The calcium carbonate cement reaction is based on the polymorphic transformation from metastable vaterite to aragonite and can achieve >40 MPa compressive strength. Due to its unique properties, the calcium carbonate cement is well suited for building materials applications with controlled factory manufacturing processes that can take advantage of its rapid curing at elevated temperatures and lower density for competitive advantages. Examples of suitable applications are lightweight fiber cement board and aerated concrete. The new cement system described is an environmentally sustainable alternative cement that can be carbon negative, meaning more carbon dioxide is captured during its manufacture than is emitted.

Keywords:Cement; Calcium carbonate; Vaterite



ASTM C109 14 60

40 60 80°C 95% 80°C 7 3 4 10 80

1 4 1

60°C

3 7 14 24

40 60 80°C

105°C 4

1 kN/s

4.结果

4.1

MgCl₂ MgSO₄ Mg(C₂H₃O₂)₂

15 4μm

D90 D10 19 11 μm SrCl₂, Sr(C₂H₃O₂)₂

4% 0.4 μm

CSTR

001 15

001 vaterite

/

Nielsen

NH₄Cl

5 讨论

5.1

2500

HCl NH₃ HCl NH₃ NH₄Cl

95% 90wt% Ca(OH)₂

1 wt%

CaCl₂ >99 wt%

4.2

pH 12.4

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2019 5.1-6.4

35-60wt% CaO

40

3-13 3-13

40°C 1

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