Accepted Manuscript

Title: Green synthesis of mesoporous γ-Al_2O_3 from coal fly ash with simultaneous on-site utilization of CO_2

Authors: Feng Yan, Jianguo Jiang, Nuo Liu, Yuchen Gao, Yuan Meng, Kaimin Li, Xuejing Chen

PII: S0304-3894(18)30664-2
DOI: https://doi.org/10.1016/j.jhazmat.2018.07.104
Reference: HAZMAT 19613

To appear in: *Journal of Hazardous Materials*

Received date: 28-7-2017
Revised date: 12-11-2017
Accepted date: 27-7-2018

Please cite this article as: Yan F, Jiang J, Liu N, Gao Y, Meng Y, Li K, Chen X, Green synthesis of mesoporous γ-Al_2O_3 from coal fly ash with simultaneous on-site utilization of CO_2, *Journal of Hazardous Materials* (2018), https://doi.org/10.1016/j.jhazmat.2018.07.104

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Green synthesis of mesoporous γ-Al_2O_3 from coal fly ash with simultaneous on-site utilization of CO_2

*Feng Yan,[a] Jianguo Jiang,[a,b,c] * Nuo Liu,[a] Yuchen Gao,[a] Yuan Meng,[a] Kaimin Li,[a] and Xuejing Chen*[a]

[a] School of Environment, Tsinghua University, Beijing 100084, China.

[b] Key Laboratory for Solid Waste Management and Environment Safety, Ministry of Education, Beijing 100084, China.

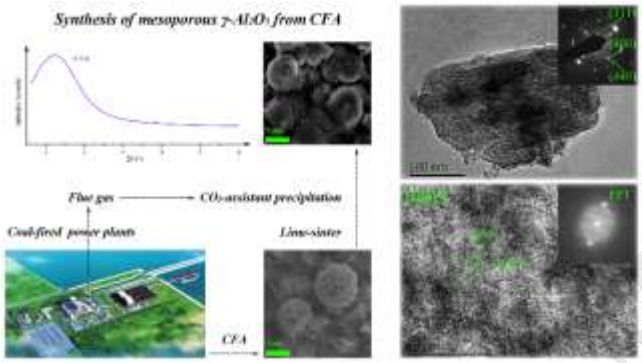
[c] Collaborative Innovation Center for Regional Environmental Quality, Tsinghua University, Beijing 100084, China.

***Corresponding author:**

Prof. Dr. Jianguo Jiang (School of Environment, Tsinghua University, Beijing 100084, China.)

Tel./Fax.: +8610-62783548; E-mail address: jianguoj@mail.tsinghua.edu.cn

Graphical Abstract



Highlights

- Facile conversion of coal fly ash into highly ordered mesoporous γ-Al_2O_3.
- Practical extraction technique and high extraction efficiency of aluminum.
- Green and rapid synthesis of γ-Al_2O_3 through the CO_2-assistant precipitation.
- Synthetic product shows crystalline framework walls and ordered mesostructure

ABSTRACT: Mesoporous Al_2O_3 with crystalline framework walls has expanded all over the world due to the various potential applications especially in catalysis. Here, we develop a green and facile approach for the conversion of coal fly ash (CFA) into ordered mesoporous γ-Al_2O_3. The practical and promising lime-sinter method was comprehensively studied for the extraction of aluminum from CFA as a first step. The extraction efficiency of aluminum could reach up to 87.42%, through calcining with $CaCO_3$ at 1390°C for 1 h and then dissolving in Na_2CO_3 solution at 70°C for 0.5 h. Combined with the urgent demand for CO_2 emission reduction, simulated purified flue gas was introduced to precipitate the $Al(OH)_3$ precursors without structure-directing agents for just 1 h, followed by calcining at only 400°C or 550°C. A series of characterizations were conducted to discuss the effect of precipitation temperature and calcination temperature, resulting the superior product (Al_2O_3-65/550) with high surface area (230.3 m^2 g^{-1}), crystalline

Download English Version:

https://daneshyari.com/en/article/6968110

Download Persian Version:

https://daneshyari.com/article/6968110

Daneshyari.com