

## Accepted Manuscript

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PII: S1385-8947(17)31721-7  
DOI: <https://doi.org/10.1016/j.cej.2017.10.015>  
Reference: CEJ 17799

To appear in: *Chemical Engineering Journal*

Received Date: 15 August 2017  
Revised Date: 1 October 2017  
Accepted Date: 3 October 2017

Please cite this article as: B. Wu, L. Su, X. Dai, X. Chai, Development of sludge-derived mesoporous material with loaded nano CaO<sub>2</sub> and doped Fe for re-utilization of dewatered waste-activated sludge as dewatering aids, *Chemical Engineering Journal* (2017), doi: <https://doi.org/10.1016/j.cej.2017.10.015>

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**Development of sludge-derived mesoporous material with loaded nano CaO<sub>2</sub> and doped Fe for re-utilization of dewatered waste-activated sludge as dewatering aids**

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**Abstract:** A novel approach to converting dewatered waste-activated sludge (WAS) into conditioning reagents for enhanced dewatering of raw WAS is proposed in this study. Primarily, WAS pretreated by K<sub>2</sub>FeO<sub>4</sub> was dewatered and converted into Fe-doped sludge-derived mesoporous material (SDMM) through thermal cracking methods. Subsequently, half of the resulting SDMM were modified by H<sub>2</sub>SO<sub>4</sub>-HNO<sub>3</sub> coupled with thermal reflux to realize the carboxylation, and the remaining SDMM was used as the template for nano CaO<sub>2</sub> loading. As a result, nano CaO<sub>2</sub>-loaded Fe-doped SDMM and carboxylic SDMM were successfully synthesized and jointly used to improve the dewaterability of raw WAS. The carboxylic material created the

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