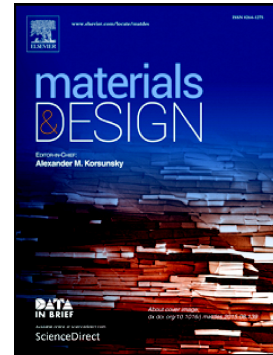


## Accepted Manuscript

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PII: S0264-1275(16)31609-4  
DOI: doi: [10.1016/j.matdes.2016.12.083](https://doi.org/10.1016/j.matdes.2016.12.083)  
Reference: JMADE 2628

To appear in: *Materials & Design*

Received date: 25 October 2016  
Revised date: 25 December 2016  
Accepted date: 26 December 2016

Please cite this article as: Yanjun Yin, Xueming Li, Yuanjie Shu, Xiaogang Guo, Yuhua Zhu, Xinyue Huang, Hebin Bao, Ke Xu , Highly-reactive Al/CuO nanoenergetic materials with a tubular structure. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Jmade*(2016), doi: [10.1016/j.matdes.2016.12.083](https://doi.org/10.1016/j.matdes.2016.12.083)

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# Highly-reactive Al/CuO Nanoenergetic Materials with a Tubular Structure

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## Abstract

Al/CuO nanoenergetic materials with nanotube and nanorod morphologies were prepared and investigated in this study. The CuO nanotubes and nanorods synthesized by chemical etching are homogenous on a large scale, with an external diameter in the range of 100~200 nm and typical lengths of 5~7  $\mu\text{m}$ . Each of these CuO nano-arrays was deposited on nano-Al by electrophoretic deposition. Using the Brunauer Emmett Teller method, the Al/CuO nanotube composite is determined to have a larger specific surface area ( $43.20 \text{ m}^2/\text{g}$ ) than that of the Al/CuO nanorod composite ( $16.75 \text{ m}^2/\text{g}$ ). The energy released from the Al/CuO nanotubes is approximately to 3264 J/g, which is higher than that released from the Al/CuO nanorods (2013 J/g). The combustion flames for the Al/CuO nanotubes are also more rapid and violent. It is speculated that the excellent output of energy and outstanding combustion performance of the Al/CuO nanotubes could be ascribed to their tubular architecture, which has a larger specific surface area enhances the intimate contact and mass transmission between fuel and oxide.

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