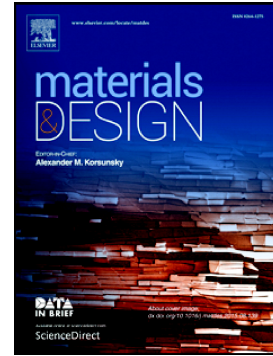


Accepted Manuscript

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PII: S0264-1275(17)30788-8
DOI: doi: [10.1016/j.matdes.2017.08.038](https://doi.org/10.1016/j.matdes.2017.08.038)
Reference: JMADE 3297
To appear in: *Materials & Design*
Received date: 21 June 2017
Revised date: 16 August 2017
Accepted date: 17 August 2017

Please cite this article as: Eva de Lucas-Gil, José F. Fernández, Fernando Rubio-Marcos , One more step against nanotoxicity: Hierarchical particles designed to antifungal properties, *Materials & Design* (2017), doi: [10.1016/j.matdes.2017.08.038](https://doi.org/10.1016/j.matdes.2017.08.038)

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One more step against nanotoxicity: hierarchical particles designed to antifungal properties

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ABSTRACT

The interest that awakens the ZnO as material is greatly extended both by its unique properties as by its wide variety of applications. Within these applications, antimicrobial activity is gaining relevance. Especially, the bactericidal activity of ZnO nanoparticles is outstanding but little is known about antifungal activity. In addition, the recent discussion about the potential toxicity of nanoparticles and their massive use places them in the spotlight. In response to this emerging problem, a simple and general approach to synthesize *hierarchical structure* of ZnO is reported. A formation mechanism of these surprising structures is proposed. Moreover, the zinc oxide hierarchical particles obtained improves the antifungal activity towards *Aspergillus niger* in contrast to ZnO micro or nanoparticles. Due to surprising results, the different action mechanisms of ZnO hierarchical particles against fungi are studied. Thus, we pose a novel physical mechanism by which ZnO hierarchical particles achieve excellent fungicidal results.

HIGHLIGHTS

- Synthesis of ZnO hierarchical structure allows to generate flower-like structures by a formation mechanism based on oriented aggregation
- The ZnO hierarchical structure obtained improves the antifungal activity
- The antifungal activity improved is due to low participation of chemical interactions favouring a purely antifungal physical mechanism

KEYWORDS: *ZnO, hierarchical structure, antifungal activity, abrasion interactions*

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