

Accepted Manuscript

Full Length Article

Incorporation of the zosteric sodium salt in silica nanocapsules: synthesis and characterization of new fillers for antifouling coatings

Ludovica Ruggiero, Laura Crociani, Elisabetta Zendri, Naida El Habra, Paolo Guerriero

PII: S0169-4332(17)33876-X
DOI: <https://doi.org/10.1016/j.apsusc.2017.12.228>
Reference: APSUSC 38098

To appear in: *Applied Surface Science*

Received Date: 26 April 2017
Revised Date: 4 December 2017
Accepted Date: 27 December 2017

Please cite this article as: L. Ruggiero, L. Crociani, E. Zendri, N. El Habra, P. Guerriero, Incorporation of the zosteric sodium salt in silica nanocapsules: synthesis and characterization of new fillers for antifouling coatings, *Applied Surface Science* (2017), doi: <https://doi.org/10.1016/j.apsusc.2017.12.228>

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.



1 Incorporation of the zosteric sodium salt in silica nanocapsules: 2 synthesis and characterization of new fillers for antifouling 3 coatings

4 Ludovica Ruggiero^{1,2,4}, Laura Crociani^{3,4}, Elisabetta Zendri¹, Naida El Habra³, Paolo Guerriero³

5 ¹ Dipartimento di Scienze Ambientali, Informatica e Statistica (DAIS), Università Ca' Foscari – Venezia, Via Torino 155/b, 30175
6 Mestre – VE

7 ² Dipartimento di Scienze, Università degli Studi Roma Tre, Via della Vasca Navale 84, 00146 Roma - RM, Italy

8 ³ Istituto di Chimica della Materia Condensata e delle Tecnologie per l'Energia, ICMATE, CNR, C.so Stati Uniti 4, 35127 Padova

9 Email address: ludovica.ruggiero@gmail.com, laura.crociani@cnr.it

10 Abstract

11 In the last decade many commercial biocides were gradually banned for toxicity. This work reports, for the
12 first time, the synthesis and characterization of silica nanocontainers loaded with a natural product
13 antifoulant (NPA), the zosteric sodium salt which is a non-commercial and environmentally friendly product
14 with natural origin. The synthesis approach is a single step dynamic self-assembly with tetraethoxysilane
15 (TEOS) as silica precursor. Unlike conventional mesoporous silica nanoparticles, the structure of these silica
16 nanocontainers provides loading capacity and allows prolonged release of biocide species. The obtained
17 nanocapsules have been characterized morphologically by scanning electron microscopy (SEM) and
18 transmission electron microscopy (TEM). The encapsulation was checked by FTIR ATR spectroscopy and
19 thermogravimetric analyses. **The results of the release studies show the great potential of the here**
20 **presented newly developed nanofillers in all applications where a controlled release of non-toxic and**
21 **environmentally friendly biocides is required.**

22 **KEYWORDS:** Zosteric sodium salt, environmentally friendly biocide, encapsulation of biocides, silica
23 nanoparticles, TEOS

24 HIGHLIGHTS

- 26 • Design of a new system to reduce the amount of biocide in antifouling coatings
- 27 • A single step self-assembly method to encapsulate environmentally friendly biocide
- 28 • Successful encapsulation of the zosteric sodium salt in silica nanocapsules

⁴ Authors to whom any correspondence should be addressed

Download English Version:

<https://daneshyari.com/en/article/7835456>

Download Persian Version:

<https://daneshyari.com/article/7835456>

[Daneshyari.com](https://daneshyari.com)