

## Accepted Manuscript

Preparation of core-shell mesoporous silica nanoparticles with bimodal pore structures by regrowth method

Hiroataka Ishii, Takaaki Ikuno, Atsushi Shimojima, Tatsuya Okubo

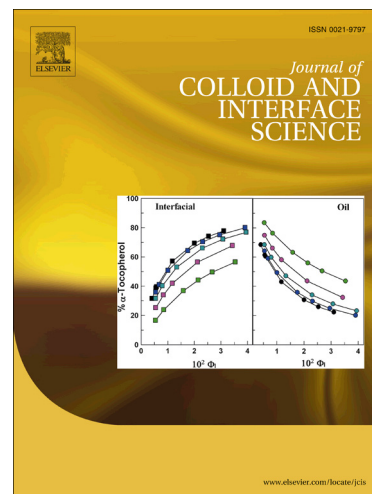
PII: S0021-9797(15)00103-4  
DOI: <http://dx.doi.org/10.1016/j.jcis.2015.01.057>  
Reference: YJCIS 20199

To appear in: *Journal of Colloid and Interface Science*

Received Date: 20 November 2014  
Accepted Date: 21 January 2015

Please cite this article as: H. Ishii, T. Ikuno, A. Shimojima, T. Okubo, Preparation of core-shell mesoporous silica nanoparticles with bimodal pore structures by regrowth method, *Journal of Colloid and Interface Science* (2015), doi: <http://dx.doi.org/10.1016/j.jcis.2015.01.057>

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.



# Preparation of core–shell mesoporous silica nanoparticles with bimodal pore structures by regrowth method

Hiroataka Ishii, Takaaki Ikuno, Atsushi Shimojima<sup>†</sup>, and Tatsuya Okubo\*

*Department of Chemical System Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan, okubo@chemsys.t.u-tokyo.ac.jp*

*<sup>†</sup>Present address: Department of Applied Chemistry, Waseda University, 3-4-1 Ohkubo, Shinjuku-ku, Tokyo 169-8555, Japan*

## Abstract

Core–shell structured mesoporous silica nanoparticles (MSNs) with different pore characteristics in the cores and shells have been prepared by the regrowth method. Adding a silica source to a dispersion of presynthesized silica–surfactant composite nanoparticles with two-dimensional hexagonal mesostructures results in regrowth in preference to generation of new particles. Core–shell MSNs with bimodal porosities are easily obtained by adding a pore-expanding agent, 1,3,5-trimethylbenzene, in either the core or shell formation step. Detailed characterization of the core–shell MSNs reveals that the shells consist of disordered arrangements of relatively large or small pores and that the pore sizes in the cores change when the shells formed. Core–shell MSNs will be useful for controlling the release rates of the encapsulated guest molecules and for protecting internal pores from being plugged by other species.

*Keywords: Mesoporous silica nanoparticles, core–shell structure, pore size control*

## 1. Introduction

Mesoporous silica nanoparticles (MSNs) have received considerable attention because of their wide range of potential applications such as catalysis, adsorption, drug delivery systems,

Download English Version:

<https://daneshyari.com/en/article/6996454>

Download Persian Version:

<https://daneshyari.com/article/6996454>

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