Accepted Manuscript

Influence of doping elements on the formation rate of silicon nanowires by silver-assisted chemical etching

C. Canevali, M. Alia, M. Fanciulli, M. Longo, R. Ruffo, C.M. Mari

PII: S0257-8972(15)30192-4
DOI: doi: 10.1016/j.surfcoat.2015.08.013
Reference: SCT 20473

To appear in: *Surface & Coatings Technology*

Received date: 30 October 2014
Revised date: 28 July 2015
Accepted date: 9 August 2015

Please cite this article as: C. Canevali, M. Alia, M. Fanciulli, M. Longo, R. Ruffo, C.M. Mari, Influence of doping elements on the formation rate of silicon nanowires by silver-assisted chemical etching, *Surface & Coatings Technology* (2015), doi: 10.1016/j.surfcoat.2015.08.013

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.

ACCEPTED MANUSCRIPT

INFLUENCE OF DOPING ELEMENTS ON THE FORMATION RATE OF SILICON NANOWIRES BY SILVER-ASSISTED CHEMICAL ETCHING

C. Canevali[1,2*], M. Alia[3], M. Fanciulli[1,3], M. Longo[3], R. Ruffo[1,2], C. M. Mari[1,2]

[1] Department of Materials Science, University of Milano-Bicocca, Via R. Cozzi 53, 20125 Milan, Italy,

[2] National Interuniversity Consortium of Materials Science and Technology, Via G. Giusti 9, 50121 Florence, Italy

[3] CNR-IMM MDM Laboratory, Via C. Olivetti 2, 20864 Agrate Brianza (MB), Italy

* carmen.canevali@unimib.it; Tel.: +39 0264485121; fax: +39 0264485400

Abstract

Metal-assisted chemical etching (MACE) has gained great interest for the preparation of vertically aligned silicon nanowires (SiNWs); however, the process mechanism has not yet been identified. In this study, the influence of doping elements on the formation rate of SiNWs prepared by silver-assisted chemical etching was investigated. Two n-type silicon substrates, bulk silicon and silicon-on-insulator (SOI) samples, containing different dopant concentrations (from 10^{11} to 10^{19} atoms cm^{-3}) and species (phosphorous and arsenic), were considered. The SiNWs formation rates increase with dopant concentration and are influenced by the dopant species. The use of SOI samples allowed to highlight the remarkable loss of the starting device layer in conventional process conditions, never previously observed; such occurrence limits the most achievable SiNWs length. The study of the gas evolution both from bulk and SOI samples allowed for the first time the *in situ* H_2 detection as well as to identify one definite overall process reaction.

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/8026016

Download Persian Version:

https://daneshyari.com/article/8026016

Daneshyari.com