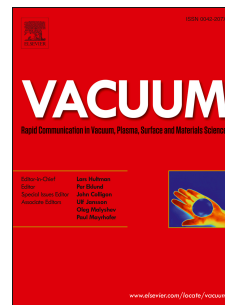


# Accepted Manuscript

A single nano-void precisely positioned in SiO<sub>2</sub>/Si substrate by focused helium ion beam technique

Che-Wei Yang, Chieh Chou, Wei-Chieh Chen, Hao-Hsiung Lin



PII: S0042-207X(17)31164-8

DOI: [10.1016/j.vacuum.2018.03.029](https://doi.org/10.1016/j.vacuum.2018.03.029)

Reference: VAC 7872

To appear in: *Vacuum*

Received Date: 27 August 2017

Revised Date: 11 January 2018

Accepted Date: 19 March 2018

Please cite this article as: Yang C-W, Chou C, Chen W-C, Lin H-H, A single nano-void precisely positioned in SiO<sub>2</sub>/Si substrate by focused helium ion beam technique, *Vacuum* (2018), doi: 10.1016/j.vacuum.2018.03.029.

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.

# A single nano-void precisely positioned in SiO<sub>2</sub>/Si substrate by focused helium ion beam technique

Che-Wei Yang<sup>1</sup>, Chieh Chou<sup>1</sup>, Wei-Chieh Chen<sup>2</sup>, and Hao-Hsiung Lin<sup>1,2,3,\*</sup>

<sup>1</sup>Graduate Institute of Electronics Engineering, National Taiwan University, Taipei, 10617, Taiwan

<sup>2</sup>Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, 10617, Taiwan

<sup>3</sup>Department of Electrical Engineering, National Taiwan University, Taipei, 10617, Taiwan

## ABSTRACT:

We report on the formation of a single nano-void, precisely positioned in SiO<sub>2</sub>/Si, using He-ion beam technique. The in-plane position of the void can be achieved by the direct writing capability of the He-ion beam system. While the depth and size of void are able to be determined by the acceleration voltage and dosage of the He<sup>+</sup>-ions, respectively. The as-written sample shows an ellipsoidal shape amorphous region in Si. Thermal treatments aggregate He-vacancy complexes and He bubble defects to form a void in the central of the region. At the same time, recrystallization starts from the boundary between the amorphous and crystal Si. Through HAADF imaging, EDX scanning profile and SEM imaging, we show the existence of a nano-void at a predicted depth. For the sample annealed at 825 °C, we observed a single void formed by {111} facets.

Keywords: focused helium ion beam; nano-voids; recrystallization

Download English Version:

<https://daneshyari.com/en/article/8044304>

Download Persian Version:

<https://daneshyari.com/article/8044304>

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