

## Accepted Manuscript

High-aspect ratio nanopatterning via combined thermal scanning probe lithography and dry etching

Y. Lisunova, M. Spieser, R.D.D. Juttin, F. Holzner, J. Brugger



PII: S0167-9317(17)30134-X  
DOI: doi: [10.1016/j.mee.2017.04.006](https://doi.org/10.1016/j.mee.2017.04.006)  
Reference: MEE 10511

To appear in: *Microelectronic Engineering*

Received date: 13 February 2017

Accepted date: 8 April 2017

Please cite this article as: Y. Lisunova, M. Spieser, R.D.D. Juttin, F. Holzner, J. Brugger, High-aspect ratio nanopatterning via combined thermal scanning probe lithography and dry etching. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Mee(2017), doi: [10.1016/j.mee.2017.04.006](https://doi.org/10.1016/j.mee.2017.04.006)

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.

## High-aspect ratio nanopatterning via combined thermal scanning probe lithography and dry etching

Y. Lisunova\*<sup>a</sup>, M. Spiesser<sup>b</sup>, R.D.D. Juttin<sup>c</sup>, F. Holzner<sup>b</sup> and J. Brugger<sup>a</sup>

<sup>a</sup>Microsystems Laboratory, EPFL, Lausanne, 1015, Switzerland

<sup>b</sup>SwissLitho, AG Zurich, 8005, Switzerland

<sup>c</sup>CMi, EPFL, Lausanne, Switzerland

E-mail address: yuliya.lisunova@epfl.ch, juergen.brugger@epfl.ch

Keywords: 2D and 3D nanopatterns, poly(phthalaldehyde), thermal scanning probe lithography, etch selectivity, dry etching.

### Abstract

Thermal scanning probe lithography is an emerging nanofabrication technique for rapid prototyping of arbitrary topographies in thermally sensitive resist. This feature, paired to the recent advances in dry plasma etching techniques, allows the fabrication of high-resolution nanopatterns in hard substrates. Here, we investigate the key process parameters allowing the fabrication of high aspect ratio nanopatterns in silicon. By a combination of resist heat treatment, the use of a hard mask and optimized etch parameters during pattern transfer, we amplified the shallow resist patterns by a factor of 100 into the silicon substrate. Low surface roughness and vertical sidewalls are thereby maintained. We demonstrate the fabrication of 240 nm wide lines and 4  $\mu\text{m}$  deep single crystal silicon patterns.

### Introduction

Download English Version:

<https://daneshyari.com/en/article/4970766>

Download Persian Version:

<https://daneshyari.com/article/4970766>

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