

Technical University of Denmark



Fast FIB-milled Electron-transparent Microchips for in situ TEM Investigations

Lei, Anders; Petersen, Dirch Hjorth; Kallesøe, Christian; MacDonald, A. Nicole; Sardan Sukas, Özlem; Booth, Tim ; Bøggild, Peter; Gyrsting, Yvonne

Publication date:
2010

[Link back to DTU Orbit](#)

Citation (APA):

Lei, A., Petersen, D. H., Kallesøe, C., MacDonald, A. N., Sardan Sukas, Ö., Booth, T., ... Gyrsting, Y. (2010). Fast FIB-milled Electron-transparent Microchips for in situ TEM Investigations. Abstract from 2010 MRS Spring Meeting & Exhibit, San Francisco, CA, United States.

DTU Library

Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Fast FIB-milled Electron-transparent Microchips for in situ TEM Investigations

Anders Lei¹, Dirch H. Petersen¹, Christian Kallesoe¹, A. Nicole MacDonald², Oezlem Sardan Sukas¹, Timothy Booth¹, Peter Boggild¹ and Yvonne Gyrsting³

¹DTU Nanotech - Micro and Nanotechnology, Technical University of Denmark, Kgs. Lyngby, Denmark

²DTU CEN - Center for Electron Nanoscopy, Technical University of Denmark, Kgs. Lyngby, Denmark

³DTU Danchip, Technical University of Denmark, Kgs. Lyngby, Denmark.

In this work we present a fast approach to 50 nm resolution structures defined in a generic TEM-chip template in few minutes. While creating complex electrical and NEMS circuits for a specific insitu TEM experiment can be a cumbersome process, microchips with 100 nm thin flakes of single crystalline silicon and silicon nitride membrane templates suspended from the edge, can be patterned in less than 15 minutes using focused ion beam milling. This approach allows a FIB-SEM user to create free-form NEMS structures for nanoresonators, actuators, heaters, resistors or other structures for insitu TEM devices or materials research using the same template. We demonstrate insitu environmental TEM analysis of Au film migration on silicon during resistive heating of a microbridge, and show how the conductance of focused ion beam milled single crystalline silicon nanowires can be adjusted insitu over two decades using a high current to recrystallise the structure.