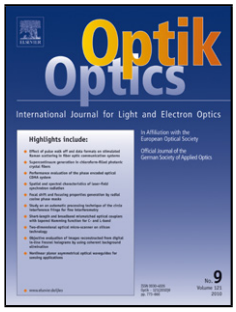


Title: Raman spectroscopy of porous silicon substrates

Authors: Magdaléna Kadlečíková, Juraj Breza, Ľubomír Vančo, Miroslav Mikolášek, Michal Hubeňák, Juraj Racko, Ján Greguš

PII: S0030-4026(18)31233-6
DOI: https://doi.org/10.1016/j.ijleo.2018.08.084
Reference: IJLEO 61381

To appear in:

Received date: 19-6-2018
Accepted date: 23-8-2018

Please cite this article as: Kadlečíková M, Breza J, Vančo Ľ, Mikolášek M, Hubeňák M, Racko J, Greguš J, Raman spectroscopy of porous silicon substrates, *Optik* (2018), https://doi.org/10.1016/j.ijleo.2018.08.084

**Raman spectroscopy of porous silicon substrates**

Magdaléna Kadlečíková[a], Juraj Breza[a*], Ľubomír Vančo[b], Miroslav Mikolášek[a],

Michal Hubeňák[c], Juraj Racko[a], Ján Greguš[d]

[a] *Slovak University of Technology in Bratislava, Faculty of Electrical Engineering and Information Technology, Ilkovičova 3, 812 19 Bratislava, Slovakia*

[b] *Slovak University of Technology in Bratislava, University Science Park Bratislava Centre,*

*Vazovova 5, 812 43 Bratislava, Slovakia*

[c] *Comenius University, Faculty of Natural Sciences, Department of Inorganic Chemistry, Mlynská dolina, Ilkovičova 6, 842 15 Bratislava, Slovakia*

[d] *Comenius University, Faculty of Mathematics, Physics and Informatics, Department of Experimental Physics,*

*Mlynská dolina, Ilkovičova 6, 842 15 Bratislava, Slovakia*

*corresponding author

telephone +421 2 60291328

mobile +421 948 268 323

e-mail juraj.breza@stuba.sk

Raman spectroscopy

Scanning electron microscopy (SEM)

**Abstract**

We have investigated the effect of the etching time on the Raman spectra of porous silicon prepared by anodic etching. Electrochemical destruction of the substrate increasing with the etching time and the correlation between the microstructure of the silicon wafer and the shape and position of their Raman spectra have been observed. Raman analysis has shown that the intensity of the Raman dominant silicon band decreases and the bandwidth is shifted to lower frequencies, depending on the morphology of the sample. Therefore we believe that the electrochemical destruction of the surface of Si substrates leads to surface amorphization.

*Keywords:* Porous silicon

## 1. Introduction

Porous silicon and nanostructured silicon are attractive materials for many applications such as sensing [1,2], energy storage [3,4] and photovoltaic conversion [5,6]. The ability to prepare porous silicon (PS) and nanostructured silicon with cheap techniques with good control and flexibility of the resulting features is a key issue for such applications. Electrochemical etching of silicon has already been successfully used for preparation of nanowires [7,8], nanopores [9] and porous silicon surface [10]. Good scalability to large areas makes this technique highly attractive for industrial applications. There are two main electrochemical etching techniques, both of them are based on hydrofluoric acid solutions for structuring of silicon: (i) metal assisted chemical etching, and (ii) anodic etching in an electrochemical cell without a metal catalyst. The first technique utilizes metal catalysts such as Au, Ag and Pt to localize etching of silicon. This localization is due to the reduction of the oxidant (typically