PLAN AND CROSS-SECTION SEM-STUDIES OF POROUS SILICON PRODUCED WITH DIFFERENT ELECTROCHEMICAL-ETCHING TIMES.

A. García-Bórquez, J. Aguilar-Hernández
Departamento de Ciencia de Materiales, ESFM-IPN, Edif. 9 UPALM 07738, México DF.
<borquez@esfm.ipn.mx>

It is known that silicon have not appreciable fotoluminescence response. However, surface porosity on it has been intensive studied in the last years due its enhanced effect on fotoluminiscence, which turn porous silicon (pSi) in a promising material for opto-electronic devices.

The task of this work is to characterize the surface microstructure produced by an electrochemical-etching with 9.9 ml HF (48% w.d.) + 0.1 ml HNO3 (65% w.d.) on [100]-Si . Different anodization times were used: 50, 360, 720 and 1020 s, in order to investigate the time (ET) inflence on the morphology, size and depth of the surface features induced by etching. Plan and cross-section views of the etching samples were achieved by a SEM-XLFEG-Sirion.

At 50 s ET enlarged features, 10-30 μm long vs. 4-6 μm wide, were observed in plan view, to be aligned each other. This explain why in cross-section only well defined cavern with an average 5 μm width were observed. The depth this cavern was near 4 μm. At 360, 720 and 1020 s ET, plan view SEM-micrographs reveals features like near oval micelles with increasing size: 20, 25 and 30 μm respectively. Faceting of the micelles contours was observed to be increased with ET. In cross-section view, the depth of the micelles remain between 5-10 μm, forming a dimpling surface. A more interesting characteristic was a high density of nanostructures funges-like formed inside the dimples.

PL-increase was also found with the increasing ET, so it could be asociated to the high density of the observed nanofeatures.