AIP Journal of Applied Physics

2001, Vol. 89, Nr. 51, pag. 2560-2565

Correlation between morphology and cathodoluminescence in porous GaP

Stevens-Kalceff M. A., Tiginyanu I. M., Langa S., Föll H., Hartnagel H. L.

https://doi.org/10.1016/j.spmi.2007.04.009

Abstract

Porous layers fabricated by anodic etching of n-GaPn-GaP substrates in a sulfuric acid solution were studied by electron microscopy and cathodoluminescence (CL) microanalysis. The morphology of porous layers was found to depend strongly upon the anodization conditions. When the etching process starts at the initial surface, "catacomb-like" pores and current-line oriented pores are introduced at low and high anodic current densities, respectively. After the initial development of either kind of pore, further anodization at the current density of about 1 mA/cm2 favors the propagation of pores along |111| crystallographic directions. The spatial and spectral distribution of CL in bulk and porous samples is presented. A comparative analysis of the secondary electron and panchromatic CL images evidenced a porosity induced increase in the emission efficiency.

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