

Author's Accepted Manuscript

Comparison of Light Emitting Capacitors with textured and polished silicon substrates towards the understanding of the emission mechanisms

J. Alarcón-Salazar, M.A. Vásquez-Agustín, E. Quiroga-González, I.E. Zaldívar-Huerta, M. Aceves-Mijares



PII: S0022-2313(18)30170-4
DOI: <https://doi.org/10.1016/j.jlumin.2018.06.060>
Reference: LUMIN15722

To appear in: *Journal of Luminescence*

Received date: 28 January 2018
Revised date: 16 June 2018
Accepted date: 19 June 2018

Cite this article as: J. Alarcón-Salazar, M.A. Vásquez-Agustín, E. Quiroga-González, I.E. Zaldívar-Huerta and M. Aceves-Mijares, Comparison of Light Emitting Capacitors with textured and polished silicon substrates towards the understanding of the emission mechanisms, *Journal of Luminescence*, <https://doi.org/10.1016/j.jlumin.2018.06.060>

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 galley proof before it is published in its final citable 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.

Comparison of Light Emitting Capacitors with textured and polished silicon substrates towards the understanding of the emission mechanisms

J. Alarcón-Salazar^{1*}, M. A. Vásquez-Agustín², E. Quiroga-González³, I. E. Zaldívar-Huerta¹ and M. Aceves-Mijares^{1*}

¹Electronics department, Instituto Nacional de Astrofísica Óptica y Electrónica, Puebla 72000, México.

²Benemérita Universidad Autónoma de Puebla, Puebla 72570, México.

³Institute of Physics, Benemérita Universidad Autónoma de Puebla, Puebla 72570, México.

*j.alarcon.sal@gmail.com

*maceves@ieee.org

Abstract

We experimentally compare characteristics of Light Emitting Capacitors (LECs) using textured and polished silicon surface. The goal of this work is to investigate the influence in the LECs electro-optical properties with the use of roughening silicon surfaces and off-stoichiometric silicon oxide (SiO_x). The textured surface is generated by reactive ion etching using Ar and SF_6 as ion sources. The textured substrate exhibits an average roughness of 4.0 ± 0.2 nm with spike density of $3.7 \pm 1.8 \times 10^{10} \text{ cm}^{-2}$. The SiO_x is deposited by low-pressure chemical vapor deposition on polished and textured substrates. LECs with textured substrate diminish the turn-on electric field from 8.5 MV/cm to 7.0 MV/cm and improve the power conversion 4.1 times compared with LECs on polished substrate. Furthermore, in LECs with textured substrate the electrical current increases at the initial low voltages and in the high current regimen the initial increase is sustained. The spikes on the silicon substrate improve carrier injection at low electric fields, causing more trapping of electrons in the SiO_x and enhancing the electroluminescence response at high electric fields. An explanation of the electro-emission mechanisms is proposed. Also, a

Download English Version:

<https://daneshyari.com/en/article/7839812>

Download Persian Version:

<https://daneshyari.com/article/7839812>

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