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ANALYSIS OF THE ELECTRO-PHOTONIC PROPERTIES OF SILICON-BASED LIGHT EMITTING CAPACITORS

This work shows an electro-photonic characterization of light emitting capacitors (LECs) based on silicon rich oxide films (SRO) as active material. The LEC structure is based on metal-oxide-semiconductor (MOS) capacitor with polysilicon as top M-electrode and p-type silicon as semiconductor substrate. These devices exhibit a high current at low voltages with some current jumps/drops that produce the appearing/disappearing of electroluminescent (EL) spots on the surface of the top poly-Si contact [1]. These current jumps/drops are related to resistive switching (RS) events from low resistance (LRS) to high resistance states (HRS) through the competition of the formation/annihilation of preferential conductive filaments (CF) within the SRO films. This chaotic electro-photonic behavior can be annihilated by increasing the electric field to the LEC, which is dependent on the gate area of the devices. Once the CFs are annihilated the device emit a strong EL on the whole area of the devices. The electro-photonic characterization of these devices includes the current-voltage curves, EL spectra, optical power and endurance.

Keywords

Electroluminescence, silicon rich oxide, conductive filaments, light emitting capacitors

Reference

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