The second harmonic emission line of an Nd:YAG laser (532 nm) was used for the ablation of a high purity Zn target (99.99%) Plasmaterials Inc., rotating at 15 rpm. Nanostructured ZnO thin films were grown on glass substrates at room temperature using a 20 % oxygen balance argon certified gas mixture as reactive atmosphere. Working pressure was fixed at $2 \times 10^{-2}$ Torr. By the use of laser attenuators, the plasma density ($N_p$) was set to $2 \times 10^{13}$ cm$^{-3}$ while the mean ion kinetic energy of the plasma ($E_k$) was varied in 60, 80 and 100 eV. Plasma parameters $N_p$ and $E_k$ were calculated the time of flight curves obtained Langmuir planar probe measurements. Influence of the plasma parameters on optical, structural and electrical properties of the ZnO nanostructured thin films were investigated. Crystalline profiles by XRD shows a preferential orientation in the [101] direction and the appearance of a width peak corresponding to the (002) plane, of ZnO Wurtzite phase. Samples showed a thickness of 60-98 nm and crystallite sizes between 80-50 nm. Compared to ZnO films grown using the IR line (?=1064 nm), samples showed a greater amorphization but fewer crystallite sizes. Increase in mean kinetic energy turns into a loss of intensity in diffraction peak in all ZnO thin films. Transmittances around 85% and optical band gap energy ($E_g$) around 3.3 eV were obtained. Photoluminescence analysis and Hall effect were carried out in order to study optical emission and electrical behavior of the films.

**Keywords:** Nanostructured, Thin films, Langmuir planar probe

**Acknowledgment:**

Authors want to thank the technical assistance of Sergio Oliva (U de G) as well as the financial support CONACYT (Grant: CB2010-156773), Universidad de Guadalajara (pro-SNI). JAGdeL wants to thank CONACyT for this PhD scholarship, as well as the financial support Doctorado en Ciencia de Materiales, CUCEI (PROINPEP, UdeG).

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