Plasma plume characterization of isotope enriched boron films obtained by pulsed laser deposition

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A pulsed laser deposition technique is very useful for thin film production and it was implemented at IPEN with a borrowed chamber from IEAv-CTA. When the laser used as pump is a high intensity laser the film is isotope enriched due to laser plasma interactions. Since the 90s isotope enriched semiconductors are a technological promise and now they can become a reality. For instance, in CCD production there is a boron conductive layer that could have its electronic properties improved with smaller thermal conductivity. PLD thin films could supply a solution for this problem. A process control for optimum ablation and deposition is needed in order to grow boron thin films in a controlled and reproducible manner. Plasma plume spectroscopy is a very useful technique in order to monitor this process. Some atomic optical emission from laser induced plasma were used to characterize plasma temperature. There were observed Boron, Nitrogen and Oxygen emissions from the plasma and an atomic Boltzmann plot was performed with these lines. During the ablation process the plasma electronic temperature was 55,500 K (5 eV). The assumption of a local thermodynamical plasma equilibrium for enough time in order to define a temperature is less strict than an ionic equilibrium. Accordingly, Boltzmann distribution is a better description for the system than a Saha-Boltzmann one. This work is under development and further investigations will be implemented in a new high vacuum chamber designed and mounted by LNLS.
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