Analysis of temperature on microscope slide by a boron pulsed laser deposition process

André Ferreira Silva, Priscila Costa, Noe Gabriel Pinheiro Machado, Ricardo Elgul Samad, Denise Maria Zezell, Marcus Paulo Raele,Claudia Bianchi Zamataro
IPEN- CNEN/SP

A boron thin film can be used for neutrons conversion and in electrically charged particles and further detection. Since boron has a high evaporation temperature and the thickness of the boron layer needs to have few microns, pulsed laser deposition also known as PLD can be used. When producing thin films with the PLD technique, the target absorbs energy promoting the material ablation creating a plasma plume that deposits material on a substrate, thus creating a thin film. Since all the deposition occurs in a vacuum chamber, the residual heat of the plasma that condensate at the substrate can build up, thus potentially source of concern if the substrate sensitive to temperature somehow. This work reports the analysis of the variation of temperature in a microscope slide (substrate) as a function of the energy of femtosecond laser pulses. For measuring the substrate temperature a type-K thermocouple was used together with associated electronics. The thermocouple was fixed to the back of substrate with thermal grease for vacuum and connected to the microchip using a feed through in the vacuum chamber. Was detected the increase of the substrate+film starting at 6^{o}C from initial temperature (room) for the minimal laser energy 100 microjoules (25 femtoseconds).