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Band-gap engineering of ZnO can be achieved by alloying with MgO. However, the growth of $Mg_xZn_{1-x}O$ ternary alloys by means of pulsed laser deposition (PLD) related techniques is rendered difficult due to the fact that it often requires use of targets having controlled alloy ratios, expensive substrates, and post deposition thermal treatments. In this work we propose an alternative, simpler solution to control and improve the optical properties of such materials by means of nitrogen doping of the $Mg_xZn_{1-x}O$ thin films. Radio Frequency plasma beam assisted PLD (RF-PLD) in oxygen/nitrogen mixture discharge is used to grow N:MgZnO thin films on quartz, silicon and sapphire substrates. More specifically, the control and tailoring of the optical properties of the resulting films is achieved through a convenient tuning of the nitrogen/oxygen ratios in the RF plasma beam. The influence of nitrogen for different MgO concentrations in ZnO targets was investigated by means of Spectroscopic Ellipsometry, X-Ray Diffraction and photoluminescence measurements. By doping the $Mg_xZn_{1-x}O$ thin films with nitrogen we can modify in a controlled way the band gap of the films. Moreover, the crystal quality of the material improves and the band gap increases with increasing the nitrogen/oxygen ratio in the plasma, without the use of special substrates or other treatments. In this way, fewer targets are needed in order to cover a broader interval of the material band gap. Addition of nitrogen in the discharge also favors the solubility of Mg in ZnO.

**PTU-151**

**Ge nanoparticles produced by Pulsed Laser Deposition: morphological, structural and optical properties**

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Semiconductor nanometer-sized particles (nanoparticles, NPs) have been widely investigated due to their unique size dependent properties. The interest in Ge NPs is recently increasing because of their interesting physical properties such as large carrier mobility, large Bohr exciton radius and near-direct band gap that are suitable for the development of advanced optoelectronic devices and solar cells. Pulsed laser deposition (PLD) is a versatile technique that allows one to produce NPs in a one-step process when a gas atmosphere is introduced in the deposition chamber at low substrate temperatures [1]. In the last years, much effort has been devoted to the production of Si NPs [2, 3] while Ge NPs synthesis by PLD has seldom been explored [4].In this work, we have produced Ge NPs by PLD using a KrF excimer laser (wavelength = 248 nm, pulse time = 10ns) under Ar pressure (0.1-3 mbar) at room temperature (RT). The NPs were collected on Si (100) and fused silica substrates. In order to avoid the direct deposition of micron-sized liquid droplets typically obtained in the ablation process, the deposition process was performed by combining a shadow mask and an off-axis setup configuration. The influence of Ar gas pressure, time deposition, laser energy fluence and setup configuration on the morphological and structural NPs properties is presented for as-deposited and annealed by rapid thermal annealing (RTA) samples. It is found that crystalline Ge NPs with controlled size and distribution can be achieved. High uniform size distributions of Ge crystalline NPs have been successfully obtained over large areas. Finally, the Ge NPs linear optical properties and photoluminescence will be presented and discussed as a function of their morphological and structural properties.