FEMTOSECOND PULSED LASER DEPOSITION OF AMORPHOUS GALLIUM LANTHANUM OXYSULPHIDE FILMS

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We report femtosecond and nanosecond pulsed laser deposition (PLD) of gallium lanthanum oxysulphide (GLSO) films. Energy-dispersive X-ray analysis reveals that the atomic percentages of gallium, lanthanum and sulphur are well outside the conventional range for glass formation.

Amorphous chalcogenide glass is of great interest for many applications in photonics [1]. The potential to fabricate amorphous GLSO films with 'extreme' compositions is particularly attractive for the unique optical and electrical properties they may possess. The composition of GLSO fabricated by melting is known to be restricted to a particular range of compositions, outside which the material takes on a crystalline phase, even when fast quenched [2].

With reference to figure 1, we show compositional data points for PLD grown glass films, in comparison to elemental ratios for conventional melting (shaded area) [2]. A comparison between films deposited by femtosecond and nanosecond PLD shows that the compositional range of either regime varies significantly, in particular femtosecond PLD shows a unique potential for fabrication of films with compositions well away from the initial target material. In this poster, we present investigation of the effect of each deposition parameter (fluence, distance and background gas pressure) on the stoichiometric transfer of target material for femtosecond and nanosecond PLD and show that a broad range of amorphous GLSO compositions is possible. We also plan to investigate the optical and electronic properties of these films and will include all results in this poster.

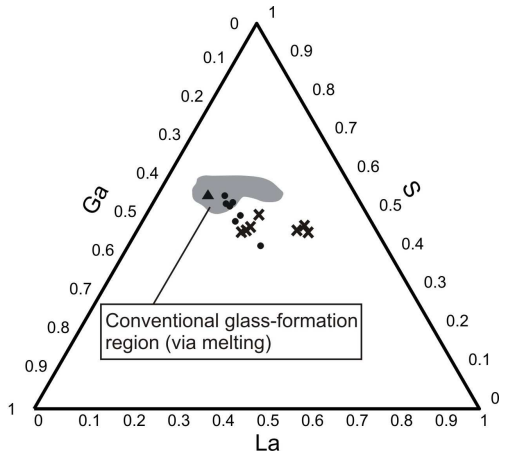

Figure 1: Composition of films fabricated by femtosecond PLD (cross), nanosecond PLD (circle). The target composition is also shown (triangle).

[1] A. Zakery and S. R. Elliott, Journal of Non-Crystalline Solids, **330**, 1 (2003)
[2] P. N. Kumta and S. H. Risbud, American Ceramic Society Bulletin, **69**, 1977 (1990)