

EPITAXIAL GROWTH OF Tm: KLu(WO₄)₂ THIN LAYERS BY LIQUID PHASE EPITAXY

O. Silvestre, M.C. Pujol, F. Güell, R. Solé, F. Gavalda, J. Massons, M. Aguiló and
F. Díaz

Física i Cristal·lografia de Materials (FiCMA). Universitat Rovira i Virgili.

Marcel·lí Domingo, s/n, 43007-Tarragona

oscar.silvestre@urv.net

In recent years, thin-disk laser designs has attracted much attention due the possibility for high doping levels and an efficient transversal cooling, especially in the high power regime. The magnitudes of the Tm³⁺ absorption and emission cross section peaks strongly depend on the chosen laser host material. The monoclinic phase of the double tungstates KLu(WO₄)₂ (KLuW), is a well known host material for doping with rare earth ions which can incorporate concentrations of Tm³⁺ at least up to 5%. The high absorption and emission cross section of Tm³⁺ in this material permit the use of very thin crystals ^[1].

KLuW single crystals for substrates have been grown by Top Seeded Solution Growth (TSSG) method with high quality, choosing K₂W₂O₇ as a solvent ^[2]. KLuW belongs to monoclinic system with the space group C2/c and its unit cell parameters are a= 10.576(7) Å, b= 10.214(7) Å, c= 7.487(2) Å and β = 130.68(4)° ^[3] and its habit is mainly formed by { 010 }, { 110 }, { 310 } and { -111 } faces. We have grown KLu_{1-x}Tm_xW / KLuW (0 ≤ x ≤ 0.05) by Liquid Phase Epitaxy (LPE) with good optical quality. Figure 1 shows an epitaxial film on (010) crystal face and some morfological details of the obtained layer. Moreover it is possible to control the layer thickness by adjusting the temperature and the growth time. (Thickness between 5 and 150 microns). The optical quality of the film on every crystal face and its velocity of growth was studied as a function of the Tm³⁺ content. The composition of the grown layers was measured by electron probe microanalysis with wavelength dispersive spectroscopy (EPMA-WDS).

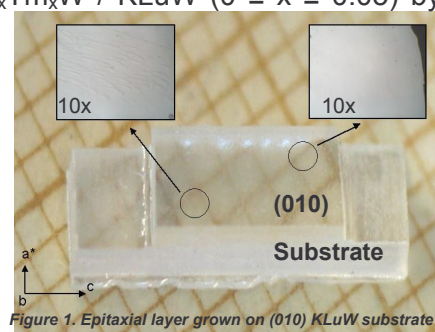


Figure 1. Epitaxial layer grown on (010) KLuW substrate

References

- [1] O. Silvestre, M.C. Pujol, F. Güell, M. Aguiló and F. Díaz, *To be submitted*.
- [2] R. Solé, V. Nikolov, X. Ruiz, J. Gavalda, X. Solans, M. Aguiló, and F. Díaz, *J. Cryst. Growth*, 169, 600 (1996).
- [3] M.C. Pujol, X. Mateos, A. Aznar, X. Solans, S. Suriñac, J. Massons, F. Díaz and M. Aguiló. Submitted to *J. of Applied Crystallography*.