Journal of Crystal Growth
Volume 275, Issues 1-2 , 15 February 2005, Pages e1035-e1040
Proceedings of the 14th International Conference on Crystal Growth and the 12th International Conference on Vapor Growth and Epitaxy

doi:10.1016/j.jcrysgro.2004.11.127 Cite or Link Using DOI
Copyright © 2004 Elsevier B.V. All rights reserved.

Thin organic heterostructures deposited via organic vapor phase deposition: spectroscopic ellipsometry characterization

C. Himcinschi[a], , , S. Hartmann[b], A. Janssen[b], N. Meyer[c], M. Friedrich[a], W. Kowalsky[b], D.R.T. Zahn[a] and M. Heuken[c]

[a]Institut für Physik, Halbleiterphysik, Technische Universität Chemnitz, Reichenhainerstr 70, D-09107 Chemnitz, Germany
[b]Labor für Elektrooptik am Institut für Hochfrequenztechnik, Technische Universität Braunschweig, D-38106 Braunschweig, Germany
[c]AIXTRON AG, D-52072 Aachen, Germany

Available online 15 December 2004.

Abstract

Thin heterostructures and mixed layers of tris(8–hydroxyquinoline)-aluminum(III) (Alq_3) and N,N′-Di-[(1-naphthyl)-N,N′-diphenyl]-(1,1′-biphenyl)-4,4′-diamine (α-NPD) were deposited on large-area silicon substrates by means of the recently developed organic vapor phase deposition (OVPD) method. Variable angle spectroscopic ellipsometry (VASE) was employed as a non-destructive technique to measure the thickness and optical constants of the single layers deposited by OVPD. Using the determined optical constants it is demonstrated that spectroscopic ellipsometry is capable of determining the thicknesses of individual layers in Alq_3/α-NPD heterostructures. Furthermore, the percentage of mixing in uniformly mixed Alq_3–α–NPD layers can be determined from the analysis of the ellipsometric data. A simulation of ellipsometric parameters Ψ and Δ demonstrates that ellipsometry is a very suitable tool for in situ real-time thickness monitoring during the OVPD deposition process.

Keywords: A3. Organic vapor phase deposition; B2. Organic semiconducting materials; B3. Light-emitting diodes

PACS: 78.20Ci; 81.70.Fy; 81.15.Kk

Corresponding author. Tel.: +49 371 531 3043; fax: +49 371 531 3060.