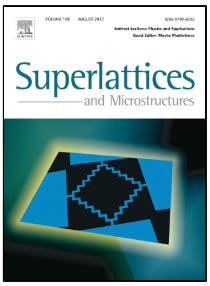
Accepted Manuscript



Microstructural and electrical properties of Al/n-type Si Schottky diodes with Au-CuPc nanocomposite films as interlayer

P.R. Sekhar Reddy, V. Janardhanam, I. Jyothi, Han Soo Chang, Sung Nam Lee, Myung Sun Lee, V. Rajagopal Reddy, Chel Jong Choi

PII:	S0749-6036(17)31337-X
DOI:	10.1016/j.spmi.2017.07.002
Reference:	YSPMI 5112
To appear in:	*Superlattices and Microstructures*
Received Date:	30 May 2017
Revised Date:	25 June 2017
Accepted Date:	01 July 2017

Please cite this article as: P.R. Sekhar Reddy, V. Janardhanam, I. Jyothi, Han Soo Chang, Sung Nam Lee, Myung Sun Lee, V. Rajagopal Reddy, Chel Jong Choi, Microstructural and electrical properties of Al/n-type Si Schottky diodes with Au-CuPc nanocomposite films as interlayer, *Superlattices and Microstructures* (2017), doi: 10.1016/j.spmi.2017.07.002

Microstructural and electrical properties of Al/n-type Si Schottky diodes with Au-CuPc nanocomposite films as interlayer

P. R. Sekhar Reddy[a,1],V. Janardhanam[a,1], I. Jyothi[a], Han Soo Chang[a], Sung Nam Lee[b], Myung Sun Lee[c], V. Rajagopal Reddy[d,*] and Chel Jong Choi[a,*]

[a] *School of Semiconductor and Chemical Engineering, Semiconductor Physics Research Center (SPRC) Chonbuk National University, Jeonju 561-756, Republic of Korea.*
[b] *Department of Nano-Optical Engineering, Korea Polytechnic University, Siheung 429-793, Republic of Korea.*
[c] *Department of Beauty & Health, Daejeon University, Daejeon 34520, Republic of Korea.*
[d] *Department of Physics, Sri Venkateswara University, Tirupati-517502, India.*

Abstract

Au-CuPc nanocomposite films were prepared by simultaneous evaporation of Au and CuPc with various Au and CuPc concentrations. Microstructural analysis of Au-CuPc films revealed elongated Au cluster formation from isolated Au nanoclusters with increasing Au concentration associated with coalescence of Au clusters. Au-CuPc films with different compositions were employed as interlayer in Al/n-Si Schottky diode. Barrier height and series resistance of the Al/n-Si Schottky diode with Au-CuPc interlayer decreased with increasing Au concentration. This could be associated with the enhancement of electron tunneling between neighboring clusters due to decrease in spacing of Au clusters and formation of conducting paths through the composite material. Interface state density of the Al/n-Si Schottky diode with Au-CuPc interlayer increased with increasing Au concentration. This might be because the inclusion of metal decreases the crystallinity and crystal size of the polymer matrix accompanied by the formation of local defect sites at the places of metal nucleation.

Keywords: Nanocomposite, Au-CuPc, Schottky contact, barrier height, interface state density, optical band gap

[1]P.R. Sekhar Reddy and V. Janardhanam contributed equally to this work.
*email : reddy_vrg@rediffmail.com,cjchoi@jbnu.ac.kr