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Under the guidance of

Chapter-1

Introduction

1.1] Transparent Conductive Oxides (TCO)

7 **Transparent Conductive oxides** (TCO) are remarkable materials with high electrical **1** conductivity of the order of $10^4 \text{ohm}^{-1} \text{cm}^{-1}$ and high optical transparency (> 80%) **in** the visible region of electro **44** magnetic spectrum. The common TCOs that are being currently studied are – CdO, indium tin oxide (ITO), fluorine **1** doped tin oxide (FTO), impurity doped ZnO, etc. Various thin film deposition techniques such as dc sputtering, plasma enhanced chemical vapour deposition, spray pyrolysis, etc are used for TCO preparation. The research on thin film TCOs has received greater attention due to their tremendous applications in modern science and technology. Various TCOs are integrated in most of the opto-electronic devices such as flat displays, photovoltaic cells and also used as gas sensors, heat reflective mirrors etc [9,10]. A thin material created by layers of atoms/molecules/ions/cluster of species by condensation process can be termed as thin film growth. This process involves deposition of a thin layer of required material on to a backing material termed substrate. Substrates are selected as per the required applications and thin film growth conditions. Quartz, glass, Si, sapphire etc. are few examples of substrates that are being used for various thin film deposition. [1, 2, 3]

29 TCOs are wide band gap materials with greater carrier concentration in the conduction band **1** that arise from the crystal defects or dopant impurities. The higher concentration will cause absorption of electromagnetic radiations. Thus a TCO maintains a compromise between electrical conductivity and optical transmission. [1, 2, 3]

22 The properties of the TCOs are determined by the following parameters-

- 1. Method of deposition*
- 2. Substrate material & growth temperature*
- 3. Background pressure*
- 4. Rate of deposition*

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PUBLICATIONS

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STUDENT PAPERS

PRIMARY SOURCES

1

dyuthi.cusat.ac.in

Internet Source

%**9**

2

Chopra, K.L., "Transparent conductors-A status review", Thin Solid Films, 19830408

Publication

%**3**

3

Submitted to Indian Institute of Technology, Bombay

Student Paper

%**1**

4

Pain, "Electromagnetic Waves", The Physics of Vibrations and Waves, 04/01/2005

Publication

%**1**

5

Submitted to Institute of Graduate Studies, UTM

Student Paper

%**1**

6

irdindia.in

Internet Source

%**1**

7

Submitted to Higher Education Commission Pakistan

Student Paper

%**1**

8

mse406.cankaya.edu.tr

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<%**1**

9	doras.dcu.ie Internet Source	<1%
10	www.hctl.org Internet Source	<1%
11	Submitted to University of Surrey Student Paper	<1%
12	Schmidt-Mende, L.. "ZnO - nanostructures, defects, and devices", Materials Today, 200705 Publication	<1%
13	c.wanfangdata.com.cn Internet Source	<1%
14	www.shimadzu.com Internet Source	<1%
15	Submitted to Royal Melbourne Institute of Technology Student Paper	<1%
16	www.omicsonline.com Internet Source	<1%
17	Mahmood, Khalid, Dongsu Song, and Seung Bin Park. "Effects of thermal treatment on the characteristics of boron and tantalum-doped ZnO thin films deposited by the electrospraying method at atmospheric pressure", Surface and Coatings Technology, 2012. Publication	<1%

18	Submitted to Indian Institute of Technology, Madras Student Paper	< % 1
19	Submitted to SASTRA University Student Paper	< % 1
20	"Optical Properties of Materials", Encyclopedia of Condensed Matter Physics, 2005 Publication	< % 1
21	Submitted to Savitribai Phule Pune University Student Paper	< % 1
22	S TEWARI. "Structural, electrical and optical studies on spray-deposited aluminium-doped ZnO thin films", Pramana, 05/21/2011 Publication	< % 1
23	www.science.gov Internet Source	< % 1
24	connection.ebscohost.com Internet Source	< % 1
25	www.phy.iitb.ac.in Internet Source	< % 1
26	K. Sakai. "Defect centers and optical absorption edge of degenerated semiconductor ZnO thin films grown by a reactive plasma deposition by means of piezoelectric photothermal spectroscopy",	< % 1

27

www.materialstoday.com

Internet Source

< % 1

28

Lukosz, W.. "Principles and sensitivities of integrated optical and surface plasmon sensors for direct affinity sensing and immunosensing", Biosensors and Bioelectronics, 1991

Publication

< % 1

29

Submitted to University Der Es Salaam

Student Paper

< % 1

30

inoe.inoe.ro

Internet Source

< % 1

31

Submitted to University Tun Hussein Onn Malaysia

Student Paper

< % 1

32

NATO Science Series II Mathematics Physics and Chemistry, 2005.

Publication

< % 1

33

Submitted to Texas A&M University, College Station

Student Paper

< % 1

34

Submitted to University College London

Student Paper

< % 1

35

Submitted to Yeungnam University

Student Paper

< % 1

36	Submitted to University of Limerick Student Paper	<% 1
37	Submitted to The University of Manchester Student Paper	<% 1
38	Agashe, C.. "Optimization of the electrical properties of magnetron sputtered aluminum-doped zinc oxide films for opto-electronic applications", Thin Solid Films, 20031001 Publication	<% 1
39	Proceedings of ISES World Congress 2007 (Vol I – Vol V), 2009. Publication	<% 1
40	El Sayed, A.M., S. Taha, G. Said, and F. Yakuphanoglu. "Controlling the Structural and Optical Properties of Nanostructured ZnO Thin Films by Cadmium Content", Superlattices and Microstructures, 2013. Publication	<% 1
41	Jiang-Tao Feng. "Influence of different amount of Au on the wetting behavior of PDMS membrane", Biomedical Microdevices, 02/2008 Publication	<% 1
42	docplayer.net Internet Source	<% 1
43	H. A. Mohamed. "Structure and optical constants of electron beam deposited zinc	<% 1

nitride films", The European Physical Journal
Applied Physics, 11/2009

Publication

44

e-sciencecentral.org

Internet Source

<% 1

45

www.scribd.com

Internet Source

<% 1

46

www.mdpi.com

Internet Source

<% 1

47

Shanthi, S.. "Effect of fluorine doping on structural, electrical and optical properties of sprayed SnO² thin films", Journal of Crystal Growth, 19981201

Publication

<% 1

48

Y. Caglar. "Single-oscillator model and determination of optical constants of spray pyrolyzed amorphous SnO₂ thin films", The European Physical Journal B, 08/2007

Publication

<% 1

49

Cho, Y.C.. "The conversion of wettability in transparent conducting Al-doped ZnO thin film", Solid State Communications, 200904

Publication

<% 1

50

Mahadik, M. A., Y. M. Hunge, S. S. Shinde, K. Y. Rajpure, and C. H. Bhosale. "Semiconducting properties of aluminum-doped ZnO thin films grown by spray pyrolysis technique", Journal of

<% 1

51

www.infona.pl

Internet Source

<% 1

52

Bole, M.P.. "Effect of annealing temperature on the optical constants of zinc oxide films", Journal of Physics and Chemistry of Solids, 200902

Publication

<% 1

53

Moholkar, A.V.. "Effect of solvent ratio on the properties of highly oriented sprayed fluorine-doped tin oxide thin films", Materials Letters, 200706

Publication

<% 1

54

Sahay, P.P.. "Al-doped zinc oxide thin films for liquid petroleum gas (LPG) sensors", Sensors & Actuators: B. Chemical, 20080728

Publication

<% 1

55

Sanap, Vijay B.. "FABRICATION & CHARACTERIZATION OF NANOSTRUCTURED ZINC OXIDE THIN FILMS", Journal of Ovonic Research/15849953, 20110701

Publication

<% 1

56

Choi, Yong-June, Kyung-Mun Kang, Hong-Sub Lee, and Hyung-Ho Park. "Electromagnetic interference shielding behaviors of Zn-based conducting oxide films prepared by atomic layer deposition", Thin

<% 1

57

www.sntek.com

Internet Source

<% 1

58

prer.hec.gov.pk

Internet Source

<% 1

59

Mohite, V.S., M.A. Mahadik, S.S. Kumbhar, Y.M. Hunge, J.H. Kim, A.V. Moholkar, K.Y. Rajpure, and C.H. Bhosale.

"Photoelectrocatalytic degradation of benzoic acid using Au doped TiO₂ thin films", Journal of Photochemistry and Photobiology B Biology, 2015.

Publication

<% 1

60

Handbook of Nanomaterials Properties, 2014.

Publication

<% 1

61

Yakuphanoglu, F.. "The effects of fluorine on the structural, surface morphology and optical properties of ZnO thin films", Physica B: Physics of Condensed Matter, 20070501

Publication

<% 1

62

www.rose-hulman.edu

Internet Source

<% 1

63

Yinchuan Wu. "Analysis of Cased Hole

Resistivity Logging Signal Frequency Effect on Detection", Lecture Notes in Electrical Engineering, 2011

<% 1

64 Misra. "Electromagnetic Fields and Waves", Radio-Frequency and Microwave Communication Circuits, 08/17/2004 $< \% 1$
Publication

65 Hou, Qiongqiong, Fanjie Meng, and Jiaming Sun. "Electrical and optical properties of Al-doped ZnO and ZnAl₂O₄ films prepared by atomic layer deposition", Nanoscale Research Letters, 2013. $< \% 1$
Publication

66 Saroja, Gandhimathinathan, Veerapandy Vasu, and Nagayasamy Nagarani. "Optical Studies of Ag₂O Thin Film Prepared by Electron Beam Evaporation Method", Open Journal of Metal, 2013. $< \% 1$
Publication

67 Castaneda, L.. "Influence of aluminum concentration and substrate temperature on the physical characteristics of chemically sprayed ZnO: Al thin solid films deposited from zinc pentanedionate and aluminum pentanedionate", Materials Science in Semiconductor Processing, 201004 $< \% 1$
Publication

68 Garcés, F.A., N. Budini, J.A. Schmidt, and R.D. Arce. "Highly doped ZnO films deposited by spray-pyrolysis. Design parameters for optoelectronic applications", Thin Solid Films, $< \% 1$

2016.

Publication

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