# Academic Profile and Achievement Record


## Dr.A.Subrahmanyam

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**Summary of Achievement Record:**

**Awards :**

1. **1988 BOYSCAST (Better Opportunities for Young Scientists in Chosen Areas of Science and Technology ) awarded by Department of Science and Technology, Government of India**
2. **1989 Alexander von Humboldt Fellowship, Humboldt Foundation, Germany**
3. **2008-09 Nominated as Guest Professor (W3) at Technical University, Dresden, Germany.**
4. **June 2008 : Saint Gobain Chair, Ecole Polytechnique, Paris**

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|---|---|---|
| **International Refereed Journals** | **:** | **89** |
| **International Conferences** | **:** | **80** |
| **Doctoral Theses Guidance** | **:** | **10 (04 On going)** |
| **Sponsored Projects executed** | **:** | **27 (04 On going)** |
| **International consultancy / Sponsored projects** | **:** | **04** |
| **Patents (Filed /awarded)** | **:** | **06 (02 awarded)** |

**Technologies Developed:**

1. **ITO on Kapton for Indian Space Research (ISRO)**

2. **Pilot Plant (first plant) for ITO Coatings (With SAMEER Chennai)**

3. **Gun Barrel coatings (with ARCI, Hyderabad)**

**Presently working on Artificial Lungs (in collaboration with Apollo Hospitals)**

**Professional Record:**

Sept. 2000 – to date: Professor, Department of Physics, IIT, Madras, Chennai

June 1995 – Sept. 2000: Associate Professor, Department of Physics, IIT, Madras, Chennai

July 1990 – May 1995: Assistant Professor, Department of Physics, IIT, Madras, Chennai.

Dec. 1982 – June 1990: Lecturer, Department of Physics, IIT, Madras

Oct. 1980 - Dec. 1982: Lecturer, Birla Institute of Technology & Science [BITS], Pilani (Rajasthan)

**Awards / Fellowships:**

1.1988 BOYSCAST (Better Opportunities for Young Scientists in Chosen Areas of Science and Technology ) awarded by Department of Science and Technology, Government of India

2. 1989 Alexander von Humboldt Fellowship, Humboldt Foundation, Germany

**Education**

B. Sc. Physics - [1973]; Andhra University, Visakhapatnam, India

M. Sc. hysics -[1975]; Andhra University, Visakhapatnam, India

Ph. D. Physics -[1980]; Indian Institute of Technology, Khargpur, India

**Post-doctoral experience**

January 1980 – October 1980 : Research Associate, International Centre for Theoretical Physics, Trieste, Italy

**Academic experience**

**a. Teaching** Experience - 27 years

**Advanced graduate level:**

1. Semiconductor Physics
2. Atomic and Molecular Physics
3. Transducer Technology
4. Microprocessor based Physics Instrumentation
5. Physics and Technology of Photovoltaics*
6. Advanced Electromagnetic Theory
7. Basic Quantum Mechanics

* This course has been designed and developed for Master of Technology curriculum.

Also has experience in teaching courses using concepts of web based curriculum: presently teaching Quantum Mechanics for Engineers through the web.

**Graduate level :**

1. Basic Electromagnetic Theory
2. Semiconductor Physics
3. Condensed matter Physics

**Undergraduate level :**

1. Basic Physics (PH 101, PH 102 and PH 201)
2. Quantum Mechanics for Engineers

- Coordinated B. Tech and M. Sc. programmes
- Developed new courses at M. Sc. and M. Tech. level.

**Teaching at International Institutes:**

Taught a summer course (PH142) on basic electricity, magnetism and electromagnetic theory at the University of Illinois, Chicago during the summer of 1996 (rated as very good teacher).

Taught a course on the Basics and Advanced Photovoltaics at the University of Kabengasen, Kuala Lumpur, Malaysia during Jan – Feb 1988.

**b. Research** Experience – 30 years

***Areas of specialization***

**Metal Oxide Thin Films and Devices**

- Indium Tin Oxide (ITO)
- Vanadium Oxide Thin Films for optical Switching
- Solid state electro-chromic devices (WO3)
- Nano thin films for optical memories (Ag2O)

**Magnetron Design Fabrication**

- Cylindrical and planar magnetron cathodes

**Semiconductor Materials and Devices**

- Wide gap Nitrides (Indium Gallium Nitride)
- Photovoltaics

**Plasma Diagnostic Techniques**

- Langmuir Probe
- Optical Emission Spectroscopy

**Photocatalysis for Oxygenation of Blood**

**Patents awarded :**

1. Scratch resistance Coatings on Plastic Lenses
(195/MAS/2003 dated 10 March 2003)

2. Electrically Conducting Coatings on Kapton Films for ESD
(223 /MAS/2003 dated 19 March 2003)

**Patents applied:**

1. Artificial Infusion of oxygen into human blood by
Photocatalytic reaction (427 CHE 2006 dated 10 March 2006)

2. Electron beam induced chromism and photo-luminescence in reactive DC Magnetron sputtered non-stoichiometric tungsten oxide thin films (653 CHE 2006 dated 10.04.2006)
3. Nano silver for optical read / write memories (Filed by Department of Information Technology, Govt of India, 1207/CHE/2006, December 2006).
4. Design of Cylindrical magnetron with embedded optical emission spectroscopy for process control (21/DEL/2008, 03 January 2008).

**Invited and key note lectures:**

4. **PSE 2006 (**International conferce on Plasma and Surface Engineering, Garmisch Partenkirchen, Germany, September 2006)

   **Key note lecture on : recent trends in Transparent conducting oxides : A Review**

5. **Indo – Japan workshop on ZnO material and devices**
   New Delhi, December 2006

   **Invited: The present status od p- type ZnO thin films**

3. **ASAIO Conference**
   New Delhi, October 2006

   **Invited: The ITO films in display technology**

4. **ASME Conference**
   Seattle, USA May 2006
   **Invited: TiO2 for oxygenation of human blood**

List to be updated

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**Professional credits**

Member, American Vacuum Society, New York

Member, Semiconductor Society, New Delhi

Elected Member, Dielectrics Society, London

**Life member, Indian Vacuum Society**

Elected Member, Plasma Group, European Commission

**Administrative experience**

Feb. 2003 – May 2006 : Head, Department of Physics, IIT, Madras, Chennai

July 2003 – August 2004 : Chairman, JAM, IIT Madras

April 1999 – March 2002 :Warden, Tapti Hostel, IIT Madras

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**Organizational involvement:**

1. Organized a Short Term Course on "Fundamentals of Photovoltaic Materials and Devices, IIT Madras, June 1986.

2. Worked as Secretary for the 2nd National Symposium in Defects in Insulating Solids, IIT Madras , February 1988

3. Organized a Short term course on " Photovoltaics for Terristrial and Space Applications" , IIT Madras, February 1996

4. Organized a Short term course exclusively for the industry on "Recent Trends and Market Potential of Photovoltaics" IIT Madras, July 1997

5. Worked as Member in the 9th Plan Research Planning Committee to the Ministry of Non Conventional Energy Sources, Government of India (2000-2001).

6. Technical Expert member to the Andaman Nicobar Administration for Photovoltaic Tender Evaluation (2000 – 2001)

7. **Working committee member, Ministry of Information Technology (for Electronic components, Materials and Photonics) 2002- 2008.**

8. Board of Academic Studies member for : Cochin University of Science and technology, Cochin and Avinashi Lingam Institute (Deemed University), Coimbatore (2002 -2007).

9. Director, Board of M/s Microsol Power, Hyderabad (2003 – 2004).

10. Vice Chairman for the International Workshop on Physics of Semiconductor Devices (IWPSD), December 16-20, 2003

11. Local organizing Committee Member for International Conference on Electromagnetic Interference and Compatibility (INCEMIC), December 1999 (New Delhi) and December 2003 (Chennai).

Secretary, Alumni Association, IIT Madras (1987 -88)

Joint Secretary, Humboldt Club, Madras (1995-96)

Secretary, IIT Kharagpur Alumni Association, Madras Chapter(1999 – 2002)

Joint Secretary, Semiconductor Society, New Delhi, India (1998 – 2001)

Editor, BOYSCAST News Letter (1998 -2000)

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Ph.D. Theses guided:

| S.No | Name of the student | Title of the Thesis | Year of award |
|---|---|---|---|
| 1 | N.Balasubramanian | Studies on Evaporated Indium Tin Oxide (ITO) Films and the Junctions of ITO / Si and ITO / GaAs | 1989 |
| 2 | V.Vasu | Investigations on Pyrolytically Sprayed Tin Doped Indium Oxide (ITO) Films and Junctions of ITO / Si and ITO / InP | 1991 |
| 3 | P.Manivannan | Studies on Indium Tin Oxide (ITO) Films and Junctions of ITO / InP Prepared by Reactive e Beam Evaporation | 1994 |
| 4 | Viswanath Bhat Krishna | Studies on Ultra thin oxides of Silicon grown by Wet and Plasma Assisted Oxidation techniques | 2000 |
| 5 | Ullash Kumar Barik | Studies on electrical and optical properties of silver : indium oxide thin films by reactive DC Magnetron sputtering and reactive electron beam, evaporation technique | 2005 |
| 6 | Umakant Tripathy | Dipole-dipole interaction-induced excitation energy migration and transfer in organic Dye pairs and their non-linear Photophysics | 2006 |
| 7 | Krishna Kumar | Synthesis and applications of rare earth based AB2 alloy hydrides and carbon nanotubes | 2007 |
| 8 | A.Karuppasamy | Studies on the physical properties and electrochromic performance of pure and titanium doped tungsten oxide thin films prepared by DC magnetron sputtering | 2007 |
| 9 | Muthu Karuppasamy | Studies on the electrochromic and photocatalytic properties of pure and vanadium doped tungsten oxide thin films preprared by electron beam evaporation and **DC** Magnetron sputtering techniques | 2008 Thesis being submitted |
| 10 | Krishna Valleti | Investigations on an innovative rotating cylindrical magnetron cathode and on tantalum based hard coatings | 2008 Thesis being submitted |
| 11 | Hari babu | Magnetic Properties of Some cubic laves phase compounds containing Pr,Sm,Nd,Tb and Fe | 2008 Thesis being submitted |

M.Tech Theses/ Projects guided:

| S.No | Name of the student | Title of the Thesis | Year of award |
|---|---|---|---|
| 1 | A. Ajit Kumar | Computer aided design for under water piezoelectric transducers | 1987 |
| 2 | R. Premachandran | Design, fabrication and characterisation of 100 KHz piezoelectric transducer | 1988 |
| 3 | A. Arun | Computer simulatio of Transparent conducting oxides on semiconductors and experimental studies on ZnO/Si and ZnO/GaAs junctions. | 1990 |
| 4 | Ms A.Amrita | tal Insulator Semiconductor (MIS) Solar Cells | 1994 |
| 5 | Bikash Kumar | Studies on Indium Oxide on Silicon Photovoltaic Junctions | 1995 |
| 6 | Ms.Anulekha Manjari | Low Dielectric Constant materials For Inter Layer Dielectrics in VLSI | 2001 |
| 7 | G.Vamsi Charan | Fabrication of MIS Tunnel Transistors | 2001 |
| 8 | Sanjay Mangal | Study of Wafer – to – Wafer Fusion Bonding for Sensor Applications | 2002 |
| 9 | Munish Kumar | Deposition and characterization of Nano Porous Silica Xerogel Film for use as Interlayer Dielectric in VLSI | 2002 |

## Research Publications in refereed Journals:

89. 2008 Studies on phase dependent mechanical properties of DC magnetron sputtered TaN thin films: Evaluation of super hardness in orthorhombic $Ta_4N$ phase

Krishna Valleti, **A. Subrahmanyam** , Srikant V. Joshi, A. R. Phani, M. Passacantando and S. Santucci
J.Phys D.Appl.Phys (In Print)

88. 2007 Magnetostriction of Tb0.1Ho0.9-xPrx(Fe0.9B0.1)2 (x=0-0.4) compounds

V.Hari Babu, **A.Subrahmanam** and G.Markandeyulu
J.Appl.Phys (In Print)

87. 2007 Magnetostriction of TbxHo0.75-xPr0.25(Fe0.9B0.1)2 (x=0-0.3) compounds

V.Hari Babu G.Markandeyulu and **A.Subrahmanyam**
J.Magn.Magn.Mater (In Press)

86. 2007 Growth of nano crystalline near α - phase Tantalum thin films at room temperature using cylindrical magnetron cathode

Krishna Valleti, **A. Subrahmanyam** and Shrikant V. Joshi
Surface and Coatings Technology (In Print)

85. 2008 Results on the electrochromic and photocatalytic properties of vanadium doped tungsten oxide thin films prepared by reactive dc magnetron sputtering technique

K Muthu Karuppasamy and **A Subrahmanyam**
J.Phys.D Applied Phys, vol 41 035302

84. 2007 Studies on electrochromic smart windows based on titanium doped WO3 thin films

A.Karuppasamy and **A.Subrahmanyam**
Thin Solid Films vol 516 pp 175-178

83. 2007 Giant magnetoresistance in Sm1-xNdxFe1.93 compounds

V.Haribabu, G.Markendeyulu and **A.Subrahmanyam**
Appl Phys Lett vol 90, pp 252513-16

82. 2007 Studies on the Oxygenation of human blood by Photocatalytic action

**A.Subrahmanyam**, T.Arockia Doss and T.Paul Ramesh
Artificial Organs vol 31, pp 819-825

81. 2007 Electron beam induced coloration and luminescence in layered structure of WO3 thin films grown by pulsed dc magnetron sputtering

A.Karuppasamy and **A.Subrahmanyam**
J.Appl.Phys vol 101, 113522

80. 2007 Oxygenation of human blood using photocatalytic reaction

**A.Subrahmanyam**, TPJ Ramesh and N. Ramakrishnan
ASAIO Journal, vol 53 (4), pp 434-437

79. 2007 Studies on the room temperature growth of Nano anatase phase TiO2 thin films by Pulsed DC Magnetron with oxygen as sputter gas

A. Karuppasamy and **A. Subrahmanyam**
J.Appl.Phys vol 101, 064318

Reprinted in
Virtual Journal of Nanoscale Science & Technology. April 09, 2007

78. 2007 The effect of arc suppression on the physical properties of low temperature DC magnetron sputtered tantalum thin films

**A.Subrahmanyam**, Krishna Valleti, Srikant V Joshi and G.Sundararajan
J Vac Sci and Technology vol 25, pp 378-382

77. 2007 Indium doped silver oxide thin films prepared by reactive electron beam evaporation technique: Electrical properties

**A.Subrahmanyam** and U.K.Barik
J.Materials Science vol 42, pp 6041-6045

76. 2007 Optical and electrochromic properties of oxygen sputtered Tungsten Oxide ($WO_3$) thin films

**A. Subrahmanyam** and A. Karuppasamy
Solar Energy Materials and Solar Cells vol 91, pp 266-274

75. 2007 Studies on the electrical properties of reactive DC Magnetron sputtered indium doped silver oxide thin films : the role of oxygen

**A.Subrahmanyam** and U.K.Barik
Physica B vol 391 pp 54-58

74. 2007 Effect of electron bombardment on the properties of ZnO thin films

A. Karuppasamy and **A. Subrahmanyam**

Materials Letters vol 61, 1256-1259

73. 2007 A note on fast protonic solid state electrochromic device:

$NiO_x/Ta_2O_5/WO_{3-x}$

**A. Subrahmanyam**, C. Suresh Kumar and K. Muthu Karuppasamy

Solar Energy Materials and Solar Cells, vol 61, pp 62-66

72. 2006 Nano silver oxide thin films for optical memories : New results

**A.Subrahmanyam** and P.Suman Kumar
IETE Journal of Research, vol 52 No 5

71. 2006 Oxygen sputtered Tungsten oxide thin films for enhanced electrochromic Properties

A. **Subrahmanyam**, A. Karuppasamy and C. Suresh Kumar
Electrochemical Solidstate Letters, vol 9 pp H111-H114

70. 2006 Pulsed DC Magnetron Sputtered Tantalum Nitride Hard Coatings for Tribological Applications

Aditya Aryasomayajula, Krishna Valleti, **A.Subrahmanyam** and Deepak G. Bhat
Surface and Coatings Technology vol 201, pp 4401-4405

69. 2006 Electrical and optical properties of silver doped indium oxide thin films prepared by reactive DC magnetron sputtering

**A. Subrahmanyam** and Ullash Kumar Barik

J.Phys and Chemistry of Solids vol 67, pp 1518-1523

68. 2006 Electrical and optical properties of reactive DC magnetron sputtered silver doped indium oxide thin films: role of oxygen

**A. Subrahmanyam** and Ullash Kumar Barik

J.Appl.Phys.A vol 84 pp 221-225

67. 2006 Studies on the electrochromic behaior of Lithium and Proton based solid state devices

S.Gunasekaran, **A.Subrahmanyam**, M.Karuppasamy and C.Suresh Kumar

ECS Trans. **1**, (15) 29 (2006),

Volume 1, Issue 15 pp 29-36

208th ECS Meeting, October 16-October 21, 2005, Los Angeles, California

**Electrochromics for Energy Efficiency: From the Material to the System**

Editor(s): K. Zaghib, F. D'Souza, C. Julien, J. Xu

66. 2005 Carrier Transport Mechanism in Indium tin oxide (ITO)/Silicon hetero Junctions: Effect of Chlorine
V. Vasu and **A. Subrahmanyam**
Applied Physics A vol 80, pp 823 -827

65. 2005 Synthesis of P-type transparent conducting silver: indium oxide (AIO) thin films by reactive electron beam evaporation technique
**A.Subrahmanyam** and U.K.Barik
J.Phys.Chem.Solids vol 66 pp 817-822

64. 2003 Electrical and Optical properties of Reactive DC Magnetron Sputtered Silver Oxide Thin Films: Role of Oxygen

Ullash Kumar Barik, S.Srinivasan, C.L.Nagendra and **A.Subrahmanyam**

Thin Solid Films vol 429 pp 129-134.

63. 2002 Optical nonlinearity of organic dyes as studied by Z-scan and transient grating techniques
U. Tripathy, R. J. Rajesh, P. B. Bisht, and **A. Subrahmanyam**
Proc.-Indian Acad. Sci., Chem. Sci. 114, 557-564

62. 2002 Effect of oxide growth temperature on the electrical performance of extremely thin ( ~3 nm) wet oxides of silicon

Vishwanath Krishna Bhat, K. N. Bhat and **A. Subrahmanyam**
Materials Science and Engineering B vol 98 pp 140-143

61. 2002 Electrical Characterization of MIS capacitors with Xeroxel as Dielectric
E.Anulekha Manjari, **A.Subrahmanyam**, N.Das Gupta and A.DasGupta
Applied Physics Letters vol 80, no 10 pp 1800-1803

60. 2001 Electrical and Optical properties of Silver Oxide (Ag2O) Thin Films prepared by Reactive Electron Beam Evaporation
Ullash Kumar Barik and **A.Subrahmanyam**
Proceedings of 11th Intl Workshop on Physics of Semiconductor Devices, Edited by Vikram Kumar and P.K.Basu, Allied Publishers, pp 1271 – 1274

59. 2001 Growth of ultrathin oxides of Silicon by wet oxidation at very low (0.04 atm) water vapor pressure
V K Bhat, K N Bhat and **A.Subrahmanyam**
Semicond. Sci. Technol vol 16 pp 1-5

58. 2001 Electrical Characterization of Ultrathin Oxides of Silicon Grown by Wet Oxidation at $800^0$
V. K. Bhat, K. N. Bhat and **A. Subrahmanyam**
Solid State Electronics vol 45 pp 1127 - 1135

57. 2000 Effect of Post Oxidation Annealing of the oxynitride on the C-V and G-V characteristics of Al/thin oxynitride/n-Si tunnel diodes
V.K.Bhat, K.N.Bhat and **A.Subrahmanyam**
Semicond.Sci Technol vol 15 pp 1-5

56. 2000 P-type Transparent Conducting In2O3 – Ag2O Thin Films Prepared by Reactive Electron Beam Evaporation Technique
J.Asbalter and **A.Subrahmanyam**
J.Vac.Sci and Technology vol 18 pp 1672 –1676

55. 2000 Electrical Characterization of Ultra thin oxides of Silicon Grown by N2O Plasma Assisted oxidation
V.K.Bhat, K.N.Bhat and **A.Subrahmanyam**
J.Eletronic Mater. Vol 29 pp 399- 404

54. 2000 Electrical charcterization of extremely thin (2.7 nm) Oxy nitride and oxide of Silicon grown by N2O Plasma and wet oxidation techniques at low temperatures: A comparison
Viswanath Krishna Bhat, K.N.Bhat and **A.Subrahmanyam**
Jap.J.Appl.Phys, vol 39, L159- L 162

53. 1999 Minority Carrier Life time in Silicon Solar Cells by Short Circuit Current

Decay Technique
V.Subramanian, **A.Subrahmanyam** and V.R.K.Murty
Proc of 10th Intl Workshop on Physics of Semiconductor Devices, Allied Publishers, 1999, pp 1292-1295

52. 1999 Frequency Dependence of Accumulation Capacitance of MOS Structure with Ultra thin Oxide Layer
Viswanath K Bhat, K.N.Bhat and **A.Subrahmanyam**
Proc of 10th Intl Workshop on Physics of Semiconductor Devices, Allied Publishers, 1999, pp 341- 344

51. 1999 Properties of Indium Tin Oxide Thin Films Prepared by Reactive Electron Beam Evaporation Technique for EMI Control
J.Asbalter,S.Karunakaran and **A.Subrahmanyam**
Proceedings of the International Conference on Electromagnetic Compatibility and Interference, 1999, IEEE No. 99 TH 8487, pp 366-371

50. 1999 Effect of pre-oxidation surface preparation on the growth of ultra thin oxides of silicon
Viswanath Krishna Bhat, K.N.Bhat and **A.Subrahmanyam**
Semicond.Sci Technol vol 14 ,705 - 709

49. 1999 The Growth of Ultra Thin Oxides of Silicon by Low Temperature Wet Oxidation Technique
Viswanath Krishna Bhat, M.Pattabhiraman, K.N.Bhat and **A.Subrahmanyam**
Mat.Res Bull vol 34 No.10

48. 1998 Studies on Indium Tin Oxide (ITO)/n-GaAs Junctions
**A.Subrahmanyam**, Z.Horvath, J.Karanyi and I.Racz
Proceedings of 2nd World Conference on Photovoltaics, Vienna.

47. 1998 Effect of Preoxidation cleaning on the characteristics of Al-thin $SiO_2$-Si Tunnel diodes prepared by Low temperature, Low Pressure wet oxidation
Bhat Viswanata Krishna, **A.Subrahmanyam** and K.N.Bhat
Proceedings of SPIE, The International Society for Optical Engineering, 1 (3316), pp 599 - 603

46. 1998 Studies on PECVD grown a Si:Ge alloys
K.Seetharaman, P.Senni, E.Bhattacharya and **A.Subrahmanyam**
Proceedings of SPIE, The International Society for Optical Engineering, 1 (3316), pp 682 - 685

45. 1998 Electrical and Photovoltaic study of ITO/GaAs and ITO/InP Hetero junctions
Z.Horvath, **A.Subrahmanyam** , P.Manivannan, N.Balasubramanian,

A.Nemcsics,J.Karanyi, I.Racz and Vo van Tuyen
Proceedings of the 2nd World Conference on Photovoltaic Energy Conversion, Vienna, Austria (July 6-10,1998).

44. 1996 Automated REED Type Kelvin Probe Setup for Workfunction and Surface Photovoltage Studies in Semiconductors

C.Suresh Kumar, **A.Subrahmanyam** and J.Majhi
Rev of Scientific Instr vol 67 (3) pp 805 - 808

43. 1995 Studies on transport Mechanism in Indium Tin Oxide (ITO)/p- Indium Phosphide InP) Solar Cells Prepared by Reactive Electron Beam Evaporation and Spray Pyrolysis Techniques
**A.Subrahmanyam**, V.Vasu and P.Manivannan
Proceedings of First World Conference on Photovoltaic Energy Conversion , Dec 5-9,Waikola, Hawaii, USA pp 1922 -1925

42. 1995 Characterisation of Silicon:Germanium Alloys by Rutherford Backscattering Technique
**A.Subrahmanyam**
Metals Materials And Processes Vol 6 No 4 pp 263 - 268

41. 1995 Transport Mechanism of Spray Pyrolytic grown indium tin oxide/ indium phosphide junctions
V.Vasu, P.Manivannan and **A.Subrahmanyam**
J.Appl.Phys vol 77 pp5220

40. 1994 Electrical Characterisation of Electron Beam Evaporated Indium Tin Oxide (ITO) Indium Phosphide junctions
P.Manivannan and **A.Subrahmanyam**
J.Appl.Phys vol 76 pp 2912 - 2917

39. 1993 The dominant scattering mechanism in tin doped indium oxide thin films
P.Manivannan and **A.Subrahmanyam**
J.Phys.D:Appl.Phys vol 27 pp 1085

38. 1993 Studies on the Electrical and Optical Properties of Reactive Electron Beam Evaporated Indium Tin Oxide films
P.Manivannan and **A.Subrahmanyam**
J.Phys. D: Appl.Phys vol 26 pp 1510

37. 1993 Spray Pyrolytic Grown ITO/InP Junctions: Effect of Tin Doping.
V. Vasu, **A. Subrahmanyam**, J. Kumar and P. Ramasamy,
Semicond. Sci. and Technol. vol 8 pp 437

36. 1992 Studies of the Photovoltaic Behaviour of Indium Tin Oxide (ITO)/Silicon junctions prepared by reactive thermal Evaporation technique
**A.Subrahmanyam** and N.Balasubramanian
Semicond. Sci and Tech vol 7 pp 324

35. 1992 Effect of Substrate Temperature on the Photovoltaic Properties of $In_2O_3$/InP Junctions Prepared by Spray Pyrolysis Technique
V.Vasu and **A.Subrahmanyam**
Proceedings of 6th International Photovoltaic Science and Engineering Conference, Feb 10-14, New Delhi (Oxford), pp 1083

34. 1992 Photovoltaic Properties of Indium tin oxide (ITO)/ Silicon Junctions Prepared by Spray Pyrolysis - Dependence on Oxidation time
V.Vasu and **A.Subrahmanyam**
Semicond. Sci and Tech vol 7 pp 320

33. 1992 Photovoltaic properties of sprayed $In_2O_3$ - InP junctions.
**A. Subrahmanyam**, V. Vasu, P. Santana Raghavan, J.Kumar and P. Ramasamy,
Mat. Sci. and Engg. vol B14 pp 365

32. 1992 Photovoltaic properties of Spray Pyrolytic Grown Indium Tin Oxide (ITO)/Silicon junctions - Dependence on substrate temperature.
V. Vasu and **A. Subrahmanyam**,
Semicond. Sci. & Tech. vol 7 pp 1471

31. 1991 Physical properties of sprayed $SnO_2$ films.
V. Vasu and **A. Subrahmanyam,**
Thin Solid Films vol 202 pp 283

30. 1991 Studies on Evaporated Indium Tin Oxide (ITO)/Si junctions and an estimation of ITO Workfunction
N.Balasubramanian and **A.Subrahmanaym**
J.Electro Chem Soc vol 138 pp 322

29. 1990 Studies on the Photovoltaic Characterisatics of Indium Tin Oxide (ITO)/ n-Gallium Arsenide Hetero Junctions
N.Balasubramanian and **A.Subrahmanaym**
Solar Cells vol 28 pp 319

28. 1990 Electrical and Optical properties of sprayed $SnO_2$ films: Dependence on the oxidizing agent in the starting material.

V. Vasu and **A. Subrahmanyam,**
Thin Solid Films vol 193/194 pp 973

27. 1990 Schottky diode Properties and the Photovoltaic Behaviour of Indium Tin Oxide (ITO)/n- GaAs junctions - Efffect of Arsenic Deficient GaAs Surface
N.Balasubramanian and **A.Subrahmanyam**
Semicond. Sci and Tech vol 5 pp 871

26. 1990 Reaction kinetics of the formation of Indium Tin Oxide films grown by spray pyrolysis.
V. Vasu and **A. Subrahmanyam,**
Thin Solid Films vol 193/194 pp 696

25. 1990 Electrical and Optical Properties of Sprayed $SnO_2$ films: Dependence on oxidising Agent in the Starting Material
V.Vasu and **A.Subrahmanyam**
Thin Solid FIlms vol 193/194 pp 973

24. 1990 Electrical and Optical properties of pyrolytically sprayed $SnO_2$ films- Dependence on substrate temperature and substrate- nozzle distance.
V. Vasu and **A. Subrahmanyam**,
Thin Solid Films vol 189 pp 217

23. 1990 Schottky Barrier at Indium tin oxide / n- GaAs interface - Effect of Surface arsenic deficiency
N.Balasubramanian and **A.Subrahmanyam**
Thin Solid Films vol 193/194 pp 528

22. 1989 Electrical and optical Properties of reactively Evaporated Indium Tin Oxide (ITO) Films -Dependence on Substrate Temperatures and Tin Concentration
N.Balasubramanian and **A.Subrahmanyam**
J.Phys. D: Appl.Phys vol 22 pp 206

(**Also appeared in Engineering Optics May 89 issue**)

21. 1988 Effect of Substratre temperature on the Electrical and Optical Properties of reactively Evaporated Indium Tin Oxide films
N.Balasubramanian and **A.Subrahmanyam**
Mat.Sci and Engg vol B1 pp 279

20. 1988 Dielectric Properties of $HgCl_2$:2KCl:$H_2O$ single Crystals in the rf range
S.Sree Hari Sastry, G.Satyanandam, **A.Subrahmanyam** and V.R.K.Murty
phys.stat.solidi(a) vol 105 pp K71

19. 1986 Role of Impurities in $Zn_3P_2$ Crystals
**A.Subrahmanyam**, K.R.Murali and J.Sobhanadri
J.Materials Science and Engineering vol 79 pp 239

18. 1986 Dielectric Properties of CsBr Single Crystals - Effect of DC Bias
K.V.S.Badarinath and **A.Subrahmanyam**
Solid State Communications vol 58 pp 137

17. 1986 Effect of DC Bias on the Dielectric Properties of Rutile Crystals
S.Sree Hari Sastry, C.R.K.Murty and **A.Subrahmanyam**
J.Materials. Science Letters vol 5 pp 859

16. 1986 Dielectric Properties of Tetra methyl ammonium tri and tetra halo mercurates
S.Sree Hari Sastry, C.R.K.Murty and **A.Subrahmanyam**
phys.stat.solidi(a) vol 95 pp K57

15. 1985 Dielectric Properties of $Zn_3P_2$ Crystals
**A.Subrahmanyam**, K.R.Murali, B.S.V.Gopalam and J.Sobhanadri
phys.stat.solidi(a) vol 88 pp 681

14. 1985 Dielectric Properties of KCl and NaCl Crystals -Time effects
**A.Subrahmanyam**
Solid State Communications vo l55 pp 1127

13. 1984 Dielectric Properties of RbCl Single crystals
**A.Subrahmanyam** and K.V.S.Badarinath
phys.stat.solidi(a) vol 84 pp K83

12. 1983 Optical absorption and Thermoluminiscence of KCl Single crystals coloured under DC fields
**A.Subrahmanyam**
phys.stat.solidi(a) vol 78 pp 665

11. 1983 Effect of DC Field and X irradiation on the optical Absorption and Thermoluminiscence of NaCl Single crystals
**A.Subrahmanyam**
phys.stat.solidi(a) vol 77 pp 45

10. 1982 Dielectric Properties of KCl single Crystals
**A.Subrahmanyam** and K.V.Rao
Ind.J.Phys vol 56A, pp 181

9. 1982 Dielectric Properties of NaCl and KCl Single Crystals X irradiated Under Different DC Fields
**A.Subrahmanyam**
phys.Stat.solidi(a) vol 69 pp 773

8. 1979 Effect of DC Field and X ray Irradiation on the F band Absorption and thermoluminiscence of NaCl Single crystals
A.Subrahmanyam and K.V.Rao
Ind.J.Pure and Appl. Phys vol 17 pp 469

7. 1979 Effect of DC Biasing Field on the Dielectric Constant of Rutile Single Crystals
**A.Subrahmanyam**, K.V.Rao and H.N.Bose
Ind.J.Phys vol 53A, pp 30

6. 1979 F band Absorption and Thermoluminiscence of KCl Single Crystals under DC field and X ray Irradiation
**A.Subrahmanyam** and K.V.Rao
phys.Stat Solidi (a) vol 52 pp K147

5. 1979 Dielectric Properties of Paddy
**A.Subrahmanyam** and K.V.Rao
Il Riso (Italy) vol 28 pp 183

(Based on this work, a moisture meter has been developed in IIT Kharagpur, India being used by farmers)

4. 1979 Estimation of vacancy concentration in X irradiated NaCl Single crystals using thermal expansion measurements
A.K.Gupta, K.V.Rao and **A.Subrahmanyam**
J.Phys.D: Appl.Phys vol 12 pp L131

3. 1979 Effect of DC biasing field on the dielectric constant of Rutile Single crystals
A.Subrahmanyam, K V Rao and H N Bose
Indian Journal of Physics vol A 53 (1-2) 30-34

2. 1979 Dielectric Properties and Short range Interaction Polarisation of CsBr Single Crystals
**A.Subrahmanyam** , A.K.Gupta and K.V.Rao
Ind.J.Pure and Appl. Phys. vol 17 pp 445

1. 1977 Dielectric Properties of $Cr_2O_3$ Single Crystals
K.V.Rao and **A.Subrahmanyam**
Ind.J.Pure and Appl. Phys vol 15, pp 359

Contributed Chapters/Papers in Books:

1. 1992 Studies on ITO/Si Junctions Prepared by Spray Pyrolysis technique
**A.Subrahmanyam** and V.Vasu
Solid State materials, Ed S.Radhakrishna and A.Daud
Narosa Publishing Co, New Delhi pp 264

2. 1993 Analysis of Semiconductor Surfaces: the Kelvin's Probe
**A.Subrahmanyam**
Semiconductor Materials, Characterisation Techniques,
Ed P.R.Vaya
Narosa Publishing , New Delhi pp 192

3. 1993 Photovoltaic Properties of Reactive Thermal Evaporated Indium Oxide (IO)/ Silicon junctions
**A.Subrahmanyam**
NATO ASI Series Ed. Orlando Auciello and Jurgen Engemann,
Kluwer Academic Publishers, vol 234 pp 389

## Papers presented in International Conferences:

1. 1987 Effect of Substrate Temperature on the electrical and Optical properties of ITO Films
N.Balasubramanian and A.Subrahmanyam
International Conference on Solid Films and Surfaces
Hamamtsu, Japan October, pp 352

2. 1987 Dependence of Electrical and Optical properties of Indium oxide films on Substrate temperature
N.Balasubramanian and A.Subrahmanyam
IV Intl Workshop on Physics of Semiconductor Devices
December 10-15, IIT Madras, pp 101-104

3. 1988 Investigations on ITO/n-GaAs heterojunctions
N.Balasubramanian and A.Subrahmanyam
Intl Conf and Intensive Tutorial Course on Semiconductor Materials and Devices, Dec 8-13, New Delhi, pp 120-121

4. 1989 Electrical and Optical Properties of ITO Films and ITO/Si Junctions Prepared by DC Magnetron Sputering
A.Subrahmanyam and Ron P Howson
7 Intl Conference on Ion and Plasma Assisted Techniques,
31 May - 2 June, Geneva, pp 310-314

5. 1990 Reaction Kinetics of the formation of Indium Tin Oxide Films Grown by Spray pyrolysis
V.Vasu and A.Subrahmanyam
17 Intl Conference on Metallurgical Coatings and Thin Films, 2-6 April,San Diego, USA, pp 696-703

6. 1990 Electrical and Optical Properties of $SnO_2$ films: Dependence on Oxidizing agent in the Starting Material
V.Vasu and A.Subrahmanyam
17 Intl Conference on Metallurgical Coatings and Thin Films, 2-6 April,San Diego, USA, pp 973 - 980

7. 1990 Schottky Barrier at Indium tin oxide (ITO) n- GaAs interface: Effect of Arsenic Deficiency
N.Balasubramanian and A.Subrahmanyam
17 Intl Conference on Metallurgical Coatings and Thin Films, 2-6 April, San Diego, USA, pp 528 - 535

8. 1992 Effect of Substrate temperature on the Photovoltaic behaviour of $In_2O_3$/InP prepared by spray pyrolysis technique.
V. Vasu and A. Subrahmanyam,
Proc. 6th International Photovoltaic Science and Engineering Conference,Feb. 1992, New Delhi, India, p. 1083.

9. 1992 Photovoltaic Properties of Reactive Thermal Evaporated Indium Oxide (IO)/ Silicon junctions
A.Subrahmanyam
NATO ASI School on Multicomponent, Multifilms for Microelectronics Applications, Bad Windsheim, Germany, October 1992, pp 192

10. 1993 X Ray Photoelectron Spectroscopy (XPS) studies of InP Surface
P.Manivannan and A.Subrahmanyam
Proceedings of 7th International Workshop on Physics of Semiconductor Devices, New Delhi pp 447

11. 1994 Anomolous Current Transport Through GaAs and InP Schottky Junctions
L.Liptak, J.Karnyi, Zs.Horvath, Vo Van Tuyen and B.Szentpali, P.Manivannan and A.Subrahmanyam
XXIII International School On Physics of Semiconducting Compounds,

Jaszowiec, Poland May 30 –June 3.

12. 1994 Anomalous Current Transport Through $A^{III}B^{V}$ Schottky Junctions
Zs Horvath, L.Liptak, Vo Van Tuyen, J.Karanyi, L.Csontos,B.Szentpali,A.Bosacchi,S.Franchi,E.Gombia,R.Mosca, P.Manivannan and A.Subrahmanyam
17 Annual Semicond Conf. CAS 94, Sinaia, Romania, Oct 11-16.

13. 1994 Studies on transport Mechanism in Indium Tin Oxide (ITO)/p-Indium Phosphide (InP) Solar Cells Prepared by Reactive ElectronBeam Evaporation and Spray Pyrolysis Techniques
A.Subrahmanyam, V.Vasu and P.Manivannan
First World Conference on Photovoltaic Energy Conversion , Dec 5-9,Waikola, Hawaii, USA

14. 1995 Capacitance - Voltage Analysis of a complex interface
A.Subrahmanyam
V International Workshop on Physics of Semiconductor Devices
New Delhi, December 5-8, 1995.

***List to be updated***

## Sponsored Research Projects:

1. Preparation and Characterisation of Indium Tin Oxide (ITO) Heterostructures

   **Council of Scientific and Industrial Research (CSIR),** Government of India

   Sanction number : 3(596)/86 - EMR II dated November 1986
   Duration of the project: August 87 till August 90
   Cost of the project: Rs 265, 000

2. Studies on the heterojunctions of Indium Tin Oxide (ITO) / Silicon prepared by Spray pyrolysis and Electron Beam Evaporation Techniques.

   **Council of Scientific and Industrial Research (CSIR),** Government of India

   Sanction number : 3 (699)/ 91 - EMR II dated February 91
   Duration of the project : March 1991 till February 1993
   Cost of the project : Rs 212,000

3. Investigations of the effect of Gamma Irradiation on Indium Tin Oxide (ITO) Based Heterostructures Prepared by Electron Beam Evaporation Technique

   **Department of Atomic Energy (DAE**), Government of India

   Sanction number : 34/6/88 - G dated May 88
   Duration of the project: August 89 till October 94
   ( with a break between August 91 till August 93)
   Cost of the project : Rs 425,000

4. Fabrication of Contact Potential Difference Setup for Surface/ Interface Analysis of Semiconductor materials and Devices

**Department of Science and Technology (DST),** Government of India

Sanction number : SP/S2/M24/ 87 dated February 1988
Duration of the project : October 1988 till September 1992
Cost of the project : Rs 653,000

5. Preliminary Investigations and Feasibility Studies on ZnO/Si and ZnO/Ge Hetero junctions

**Department of Science and Technology (DST)**, Government of India
Project sanctioned under the **Young Scientists Scheme**
Sanction number : SP/OY/P05/89 dated Sept 1990
Duration: October 1990 till September 1992
Cost : Rs 100,000

This project has been merged both in working and budget with the other project of DST (sanction number SP/S2/ M 24/ 87).

6. Studies on the Growth Parameters of Silicon : Germanium Alloys Prepared by PECVD Technique

**Department of Science and Technology (DST),** Government of India
Sanction number : SP/S2/M21/93 dated 05.05.94
Total budget in the project (Phase 1): Rs 700,000
Date of completion: October 1997.

7. Development of Optical Lens coater

**Council of Scientific and Industrial Research (CSIR),** Government of India
Sanction number : 03(0760)/94/EMR II dated November 94
Duration: TWO years
Total budget in the Project : Rs 3,50,000

8. Evaluation of Process Induced Defect Levels in Plasma Enhanced Chemical Vapour Deposited (PECVD) Silicon: Germanium Alloys

**Indo - US Project**
Sanction number: DST/INT/USIF/476/95 dated 16.08.95
Duration : Three Years ( August 1995 – December 2000)
Total Budget in the Project: Rs 1,922,440

9. Publication of BOYSCAST News Letter
**Department of Science and Technology,** Government of India
Duration : Two years (March 1999 – February 2001)
Sanction number : HRU/BYS/04/97
Total Budget: Rs 3,12,000

10. Technology Development for Indium tin oxide (ITO) coatings on plastic and glass for EMI Suppression

**Department of Electronics (Now known as Ministry of Information Technology, Government of India)**

Sanction number: 2(1)/99-M&C dated 20.07.99
Duration : One and half years (October 99 – May 2001)
Total budget: Rs 790,000

**11. Investigations on p-type conducting and transparent Oxide Thin Films by DC Magnetron Sputtering Technique**

**Council of Scientific and Industrial research (CSIR)**

Sanction Number: 3(0934)/01/EMR –II
Duration: April 2001 – March 2004 (Three Years)
Total Budget : Rs 588,000
(Suspended after one year : April 2002)

**12. Development of genetic Algorithm to study the structure of Complex systems**
**(As Co-Investigator) Principal Investigator is Prof Maha Seshasayee**

**Department of Science and Technology, Government of India**

Sanction number F.26-4/99 TS dated 21.3.2000-08-10
Duration: Three Years
Total budget: Rs 8,72,496/

**13. Development of Quality Assured process Technology for ITO coatings on Aluminized Kapton Films for Space Applications**

**Indian Space Research Organization (ISRO)**

Sanction number : ICSR/ISROIITM/PHY/074/0203/ASUB

Value of the project: :Rs 3,24,300
Duration : ONE YEAR

14. **Silver Doped Indium Oxide Thin Films for Space Applications**
**Indian Space Research Organization (ISRO)**

Sanction number : ICSR/ISROIITM/PHY/067/01-02/ASUB
Duration : May 2001 – May 2004 (Three Years)
Total budget : Rs 896,400

**15. PHOTOELECTROCHEMICAL PRODUCTION OF HYDROGEN AND STORAGE OF HYDROGEN IN COMPOSITE MATERIALS**

**Ministry of Human Resource Development**

Duration: TWO Years
Value of the Project: *Rs. 14.91 lakhs*

**16. Investigations on the reaction kinetics of silane glow discharge plasma in high frequency**

**Department of Science and Technology, Government of India**

Sanction number: SP/S2/K-11/99 dated 11.07.2001
Duration : February 2003 - March 2006
Total Budget : Rs 1,891,000

**17. Studies on Silver and Copper based Oxide Films for New and Novel p- type Transparent Conducting Oxides (TCO)**

**Defence Research and Development Organization (DRDO)**

Sanction number: ERIP/ER/00200174/M01

Value of the project : 23.48 lakhs

Duration : TWO Years

18. **Development of Solid State Electro Chromic Device for Medical Applications**

John F. Welch Technology Centre, GE India Technology Centre Pvt. Ltd. ,
Bangalore, India
Duration : ONE year (January – December 2004)
Value : Rs 13.50 Lakhs

19. **Thin Films of Indium Gallium Nitride (IGN) for Optoelectronic and Photovoltaic Applications : Basic Studies**

Defence Research and Development Organization, Govt of India

ERIP/ER/0300210/M/01/ dated 15 January 2004
Duration : THREE Years (March 2004 – February 2007)
Value : 41.5 lakhs

**20. Investigations and Development of Nano Silver Oxide for Optical Memories**

Department of Information Technology, Government of India

20(8)/2003-VCND dated 03 March 2004

Duration : TWO Years (April 2004 – March 2007)

Value : 31.5 Lakhs

## 21. Technology Development for Indium Tin Oxide Coatings on Video Monitors (Phase II)

Department of Information Technology, Government of India
1(6) 2003-M&C dated 24 March 2004
Duration : TWO Years (April 2004 – March 2006)
Value : 98.0 Lakhs

## 22. Vanadium Oxide Thin Films for temperature Sensor and Thermal Control Applications: Exploratory Studies

Indian Space Research Organization (ISRO)

ICSR/ISROIITM/Phy/0405/090/ASUB

Duration: Three years : April 2005 – September 2007,
Value : Rs 200,8000

## 23. Nano thin films for Medical applications

Department of Information Technology, Govt of India

Phy/06-07/185/DITX/ASUB
Duration: Two years : December 2006 – November 2008
Value: 24.20 Lakhs

## 24. Studies on Surface Plasmon Resonance Enhanced Fluorescence of Nano Silver Oxide doped / mixed with Gold and Copper for Ultra High Density Optical Memories

Department of Information Technology, Govt of India
Duration : TWO years
Value : 47.00 Lakhs

Three more projects are in pipeline.