



## Resumé

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### Education

B.Sc 1968, Physics, Chemistry and Mathematics, Agra University  
M.Sc 1970, Physics (Electronics), Agra University

PhD 1976, Allahabad University, Allahabad, India.

Dissertation : Study of Lattice Dynamics of Perfect/Imperfect Zinc-blende Type Crystals.

### PhD Thesis Committee

Prof. A. A. Maradudin, Irvine, California  
Prof. L. S. Kothari, New Delhi  
Prof. Bal K. Agrawal, Allahabad

### Professional Career

- 1 May 2007-todate Chairman, Department of Physics, IUP, Indiana, PA
- 2 Aug. 1993 Professor, Department of Physics, IUP, Indiana, PA
- 3 Aug. 1992-95 Solid State Electronics Division, Wright Patterson Air Force Base, Dayton, Ohio as a National Research Council (Washington) Senior Research Associate
- 4 Aug. 1991 - Aug. 93, Associate Professor, Department of Physics, IUP, Indiana, PA
- 5 Aug. 1987 - Aug. 1991, Assistant Professor, Department of Physics, IUP, Indiana, PA
- 6 Sep. 1982 - Aug. 1987, Assistant Professor, Texas A& M University
- 7 June 1983 - Aug. 1983 Visiting Scientist, Department de Physico-Chimie, CEA-CEN de Saclay, Gif-sur-Yvette, France
- 8 Jan. 1980-Aug. 1982, Visiting Assistant Professor, Department of Physics, University of Houston. Collaborated with Professor C. S. Ting on problems related to the electronic properties of defects in Semiconductors.
- 9 Dec. 1977- Dec. 1979 Visiting Scientist, Service Electronique de Saclay, Gif-sur-Yvette, France, Lab. de Electronique du Recherche Appliquées: Collaborated also with theoretical/experimental group of Professor M. Balkanski (K. Kunc, M. Zigone and G. Martinez) at the Université de Paris VI, Jussieu, Paris, France.
- 10 Apr. 1976- Dec. 1977 CSIR Postdoctoral fellow and taught Physics to freshmen, sophomore and engineering students at Allahabad University.

## Expertise

Extensive experience in the Experimental aspects of Impurity Identifications and Characterization of Nano-structured Semiconductor and Photonic materials using Infrared, Raman and Photoluminescence Spectroscopy. Extensive knowledge of the theoretical aspects of Lattice dynamics, Thermo-dynamical and Pressure dependent properties; Band structure of Elemental and Compound Semiconductors; Quantum wells and Superlattices; Electrical and Opto-electronic properties of Group III-nitride and IV-IV based materials for device applications.

## Honors

- 1 NRC Senior Research Fellow (1993-95)
- 2 IUP's Distinguished Faculty Award for Research (1993)
- 3 University Professor: The highest honor given by the IUP faculty and administration for Outstanding Teaching, Service and Research (1995)
- 4 IUP Graduate School's Award for Research (1995)
- 5 President IUP Sigma-Xi Chapter.
- 6 Distinguished Guest at the 1<sup>st</sup> Science Conclave with Nobel Laureates at Indian Institute of Information Technology (IIIT), Allahabad (December 2008)
- 7 Distinguished Guest at the 2<sup>nd</sup> Science Conclave with Nobel Laureates at Indian Institute of Information Technology (IIIT), Allahabad (December 2009)
- 8 Distinguished Guest at the 3<sup>rd</sup> Science Conclave with Nobel Laureates at Indian Institute of Information Technology (IIIT), Allahabad (December 2010)

## Professional Affiliations

- 1 Editorial Board Member: International Journal of Electronics and Information Science 2009
- 2 International Advisory Committee: Emerging Trends in Electronic and Photonic Devices and Systems 2009
- 3 Materials Research Society
- 4 American Physical Society
- 5 Sigma-Xi

## Scholarly Activities

- 1 *Referee:* Physical Review B, J. Applied Physics, Applied Physics Letters, Materials Science & Engineering B, American Institute of Physics, Materials Research Society, Scholars (A Publication of the State System of Higher Education)
- 2 *Reviewer:* NSF Programs (STTR, SBIR, EC-Directorate)
- 3 *Moderator:* PASSHE 2nd Graduate Student Research Conference 1990.
- 4 *Volunteer:* ARIN Program: Presented lectures to high school students, 1990 - 2008
- 5 *Invited:* To present a lecture in the Psychology Department IUP, on "Death and Dying-Hindu Rituals" and participated in the panel discussion 1990, 1991, 1992.
- 6 *Chair:* Ph.D Thesis Defense Committee of Ms. K. S. Suh (University of Houston, 1988).
- 7 *Organizer:* International symposium titled "Defects in Advanced Semiconductors: Physics and Applications" 1993 Fall Meeting of The Materials Research Society in Boston.

## NSF Supported RUI Program

As a PI I received funds in 1995-2003 from NSF, Research Corporation and American Chemical Society to initiate Research at Undergraduate Institutions (RUI) program in the Physics Department at Indiana University of Pennsylvania. Forty-two students participated in this program and published their research with the PI in reputed physics journals. Some

undergraduates (G. Thaller, *University of Florida*; Sarah Zaranek, *Brown University*; D. Walker, *University of Oregon*; Kitto Holiday, *Penn State*) admitted in top universities and all have completed their PhDs.

### **Research Grants**

- 1 Transport in Superlattices IUP Research associateship with a three credit hour teaching load reduction per semester and travel grant of \$2995 was awarded (1988-89).
- 2 Identification and Characterization of DX and EL2 Centers by Greens function theory and Infrared spectroscopy \$50,000, Research Corporation grant (with matching from IUP) to purchase Bio-rad FTIR spectrometer was awarded (1989).
- 3 Dynamical Behavior of Perfect and Imperfect Semiconductors - A Total Energy Calculation, National Science Foundation (NSF) grant for advanced computing resources was awarded to use Pittsburgh Super Computer facilities (1989-90).
- 4 Characterization of deep level states in semiconducting aluminum gallium arsenide, \$5980, IUP senate grant proposal was awarded (1990).
- 5 Semiconductor Characterization workstation for Undergraduate Solid State Electronics Laboratory \$82,135, National Science Foundation grant (with matching from IUP) was awarded (1990).
- 6 Electronic structure and deep impurity levels in GaAs related compound semiconductors and superlattices \$10,000, UES/Air Force Office of Scientific Research Summer fellowship at Wright Patterson Air-Force Base in Ohio, (1990).
- 7 Spectroscopic and Model studies of oxygen and hydrogen related complexes in III-V compounds \$58,000, National Research Council Senior Research Associateship was awarded to work at Wright Patterson Air-Force Base in Ohio, (1991).
- 8 Spectroscopic and Model studies on hydrogen implanted III-V compounds using 2 MeV Van de Graaff accelerator \$45,260, Research Corporation Grant Co-authored with George Matous, with matching from IUP is awarded in 1992.
- 9 Long wavelength infrared detectors \$ 61,000, National Research Council Senior Research Associateship awarded in 1993.
- 10 Novel type II strained layer superlattices based long wave length detectors \$ 40,831. Research Corporation Grant was awarded in 1995.
- 11 Identification of intrinsic defects in III-V compound semiconductors \$25,000. The Petroleum Research Fund Grant was awarded in 1995.
- 12 Electrical, optical and vibrational properties of novel semiconductors \$ 150,000. National Science Foundation Grant was awarded in 1995.
- 13 Electronic band structure of superlattices \$ 47,000, Research Corporation Grant awarded in 1998.
- 14 Structural properties of nitride based quantum wells and superlattices, \$147,000, National Science Foundation Grant awarded in 1999.
- 15 X-Ray Florescence Instrumentation Grant, Co-PI \$198,000 (with matching from IUP), National Science Foundation Grant awarded in 2001.
- 16 A DCED Grant, \$25,500 was awarded State of Pennsylvania for developing and implementing nano-modules in the Physics Curriculum in 2005.
- 17 A DCED Grant, \$14,500 was awarded State of Pennsylvania for developing and implementing nano-modules in the Physics Curriculum in 2006.
- 18 Physical property measurement system (PPMS): Instrumentation Grant, Co-PI \$369,000 (with matching from IUP), National Science Foundation Grant awarded in 2007.

- 19 A DCED Grant, \$13,000 was awarded State of Pennsylvania for developing and implementing nano-modules in the Physics Curriculum in 2007.
- 20 Characterization of intrinsic defects in group III-nitrides, American Chemical Society (Petroleum Research Funds) \$30,000 submitted
- 21 Characterization of III-N-V based semiconductors, NSF (under preparation).

### Thesis direction

- 1 P. Plumelle Ph D. thesis 1979, Université P ét M Curie Paris VI 'Modes Vibratoires d'impuretés substitutionnelles isolées dans douze composés  $A^N B^{8-N}$  possédant la structure de la blende,' principal directeur Professor M. Vandevyver, CEA-CEN de Saclay, France.
- 2 M. Zigone Ph D. thesis 1981, Université P ét M Curie Paris VI 'Variations locales de forces dues à des impuretés du type métaux de transition dans les cristaux de sulfure de zinc,' principal directeur Professor M. Balkanski, Université P ét M Curie, Paris, France.
- 3 K.S. Suh Ph D. thesis 1988, University of Houston Univ.- Park, Houston TX 'Electronic and vibrational properties of defects in semiconductors,' under my supervision.
- 4 T. D. Fang M.S. 1989, IUP 'Phonons in semiconducting alloys.'
- 5 Alan C. Coleman M.S. April 1991, IUP 'Topics in semiconductor physics'.
- 6 Feng Wen M.S. M. S. August 1991, IUP 'Electronic properties and applications of novel HgCdTe, HgZnTe and CdZnTe alloy systems'.
- 7 Michael Skoufos M. S. August 1992, IUP 'Model studies of Oxygen related defects in Si and GaAs'.
- 8 X. Yang M. S. 1992, IUP 'Effect of alloy disorder on the vibrational properties of Si-doped AlGaAs'.
- 9 Clint Hilliard, M. S. 1992, IUP 'Electronic structure and doping of III nitrides cBN and BP'.
- 10 Shu-Jun, M. S. 1992, IUP 'Anomalous phonon behavior in Cr, Mo, W, and impurity-induced vibrational modes in AlAs'.
- 11 Jim Toney, M. S. 1994, IUP 'Role of light impurities in InP'.
- 12 Dave McGraw, M. S. 1994, IUP 'Electronic properties of defects in  $\beta$ -SiC'.
- 13 Joe Sherbondy, M. S. 1995, IUP 'Lattice dynamics,  $\alpha(T)$  and Grüneisen constant of  $\beta$ -SiC'.
- 14 L. Fapahunda, M. S. 1997, IUP 'Band Structure of Semiconductors'.
- 15 Alex Price, M. S. 1999, IUP 'Reflectivity study in superlattices'.
- 16 Yoko Yukawa M.S. 1999 IUP 'Bonding properties of semiconductors'.
- 17 Aleksander Wysocki M.S. 2005 IUP 'Dynamical Properties of Beryllium Chalcogenides : Binary, ternary Materials and their Superlattices'.
- 18 Karolina Janicka M.S. 2005 IUP 'Optical Properties of Novel Semiconductor Superlattices'.
- 19 Heather Melloy M.S. 2008 IUP "Electronic properties of III-V compound semiconductors"
- 20 Joshua Wood M.S. 2009 IUP "Optical properties of Low Dimensional Semiconductor"
- 21 Krishna Simkhada M. S. 2010 IUP "GaAs/AlGaAs Quantum Well Infrared Photodetectors"
- 22 Robert Rodgers M. S. 2011

### Professional & Invited Talks at National, & International Meetings

- 1 Calculated far infrared lattice absorption spectra of cadmium telluride doped with beryllium, D. N. Talwar and Bal K. Agrawal, Solid State and Physics Symposium, Bhabha Atomic Research Center (Bombay, India) (1974).

- 2 Lattice dynamics of zinc-blende type crystals, Indo-French workshop, Indian Institute of Technology, Madras (1975).
- 3 Vibrational properties of defects in semiconductors: Bal K. Agrawal, D. N. Talwar, P. N. Ram and M. D. Tiwari, International Conference on Lattice Dynamics, Paris, France (1978).
- 4 On the infrared absorption spectra due to paired defects in semiconductors: Bal K. Agrawal and D. N. Talwar, International Conference on Lattice Dynamics, Paris, France (1978).
- 5 Defect modes and optical behavior of elemental semiconductor alloys: Bal K. Agrawal, Sunil Tripathi and D. N. Talwar, International Conference on the Physics of Semiconductors, Edinburgh (1978).
- 6 Tightbinding theory of defects in semiconductors, Bulletin American Physical Society, Phoenix, Arizona (1981).
- 7 Impurity modes due to light defects in GaAs, Bulletin American Physical Society, Dallas, Texas (1982).
- 8 Compositional and pressure induced DX-centers in III-V ternary alloys, D. N. Talwar, K. S. Suh and C. S. Ting, Bulletin American Physical Society, New Orleans, Louisiana, 33, 315 (1988).
- 9 Effects of lattice distortion on the vibrational properties of dilute semiconducting alloys, K. S. Suh, D. N. Talwar and C. S. Ting, Bulletin American Physical Society, New Orleans, Louisiana 33, 736 (1988).
- 10 Characterization of Raman active phonon modes in HgCdTe, D. N. Talwar and M. Vandevyver, XI International Conference on Raman Spectroscopy, London (Sept. 5 - 9, 1988).
- 11 Characterization of Raman Scattering spectra in AlGaP ternary Alloys, D. N. Talwar, T. D. Fang, M. Vandevyver, 1989 Fall Meeting of the Materials Research Society, Boston.
- 12 Amphoteric behavior of Si impurities in GaAs and AlGaAs, T. D. Fang and D. N. Talwar, State System of Higher Education 1<sup>st</sup> Graduate Student Conference, West Chester University of Pennsylvania, (April 1989).
- 13 Effect of alloy disorder on the vibrational properties of Si in AlGaAs, D. N. Talwar and M. Vandevyver, Bulletin American Physical Society, St. Louis (1989).
- 14 Phonon assisted properties of perfect/imperfect  $\beta$ -SiC, D. N. Talwar, M. Z. Numan and J. Matolyak, International Symposium on Single Crystal SiC : Materials and Devices, Hollywood, Florida 89-2, 703 (1989).
- 15 Cd Related impurity and local vibrational modes in HgCdTe, P. M. Amirtharaj, J. Baars, H. Seelewind and D. N. Talwar, Bulletin American Physical Society, Anaheim, California, 35, 569 (1990).
- 16 Phonons in II-VI based diluted magnetic semiconductors, D. N. Talwar, Alan Coleman, P. Amirtharaj, S. Perkowitz and Z. C. Feng, 1990 Fall Meeting of the Materials Research Society, Boston.
- 17 Lattice dynamics of II-VI magnetic semiconductors, Alan Coleman and D. N. Talwar, State System of Higher Education 2<sup>nd</sup> Graduate Student Conference, Indiana University of Pennsylvania, (April 1990).
- 18 Local mode spectroscopy and model study for assessing the role of light defects in III-V compound semiconductors D. N. Talwar, M. O. Manasreh and D. Fischer (WP AFB, Ohio), S. Pearton (AT&T Bell Labs), and G. Matous, 16th International Conference on Defects in Semiconductors ( Lehigh University 1991)

- 19 Lattice dynamics of novel CdMnTe Feng Wen, A. Schaadt, M. Z. Numan and D. N. Talwar Third annual Pennsylvania State System of Higher Education Graduate /Undergraduate Student Research Conference "(Kutztown University, April 1991)
- 20 Role of antisite defects on the dynamical properties of beta silicon carbide, by Michael Skoufos, Alan C. Coleman, J. Matolyak, and D. N. Talwar Third annual Pennsylvania State System of Higher Education Graduate /Undergraduate Student Research Conference (Kutztown University, April 1991)
- 21 Anomalous phonon properties of cuprous chloride, by Alan C. Coleman and, D.N. Talwar Third annual Pennsylvania State System of Higher Education Graduate /Undergraduate Student Research Conference (Kutztown University, April 1991)
- 22 A simple picture for understanding the effects of impurities in ternary compounds Alan Coleman and Devki Talwar, Western Pennsylvania section of the American Association of Physics Teachers ( University of Pittsburgh at Greensburgh 1991).
- 23 Effects of pressure on the phonon conductivity of cubic CuCl, D. N. Talwar and Alan Coleman Bulletin American Physical Society, Vol. 36 p. 918, Cincinnati, Ohio (1991).
- 24 Radiation induced defect centers in  $\beta$ -SiC, D. N. Talwar, M. Numan and Z. C. Feng, 1991 Fall Meeting of the Materials Research Society, Boston
- 25 Study of electronic band structure of short-period ZnTe-CdTe and ZnS-ZnSe(Te) strained layer superlattices D. N. Talwar and K. S. Suh 1991 Fall meeting of the Materials Research Society, Boston
- 26 Isochronal annealing of impurity modes in proton and deuteron- implanted InP: Theory and experiment, D. N. Talwar, D. W. Fischer, M. O. Manasreh, and G. Matous 1992 Fall Meeting of the Materials Research Society, Boston
- 27 Identification of intrinsic and radiation induced defect centers in  $\beta$ -SiC, D. N. Talwar, Harihuko Ono and Z. C. Feng (Emory University) in the Proceedings of the 21st International Conference on Physics of Semiconductors (Aug. 10-14, 1992, Beijing, China).
- 28 Compositional dependence of optical phonon frequencies in epitaxial AlGaAs Z. C. Feng, S. Perkowitz, D. N. Talwar, D. Kinnell and R. Whitney, Bulletin of American Physical Society, Vol. 37, 489 (1992).
- 29 Phonon coupling associated with free to bound and bound to bound transitions in molecular beam epitaxial GaAs, D. N. Talwar, D. C. Reynolds, M. O. Manasreh and C. E. Stutz, Bulletin of American Physical Society, Seattle, Washington (March 22-26, 1993).
- 30 Exciton bound to the center responsible for broad 0.8 eV photoluminescence, P. W. Yu, D. N. Talwar, D. C. Reynolds, C. E. Stutz and J. R. Sizelove, Bulletin of American Physical Society, Seattle, Washington (March 22-26, 1993).
- 31 Experimental and theoretical investigations of defects in cubic boron nitride, M. Fanciulli, and D. N. Talwar, 1993 Fall Meeting of the Materials Research Society, Boston.
- 32 Characterization of  $\text{Cd}_{1-x}\text{Zn}_x\text{Te}$ , D. N. Talwar, Z. C. Feng and P. Becla, 1993 Fall Meeting of the Materials Research Society, Boston.
- 33 Effects of crystal orientation on the lowest electronic energy state ordering in GaAs/AlGaAs superlattices, D. N. Talwar, J. P. Loehr and B. Jogai, 1993 Fall Meeting of the Materials Research Society, Boston.
- 34 Infrared studies and model calculations of defects in molecular beam epitaxial GaAs grown at low temperatures, D. N. Talwar, M. O. Manasreh, C. E. Stutz, R. Kaspi and K. R. Evans, 1993 Fall Meeting of the Materials Research Society, Boston.
- 35 Feasibility of InAs/InGaSb type II strained layer superlattices for long wavelength infrared detection, B. Jogai, D. N. Talwar and J. P. Loehr, First International Symposium

- on Long wavelength Infrared Detectors and Arrays : Physics and Applications, New Orleans (Oct. 11-14, 1993).
- 36 Raman studies of the effect of buffer layer and layer thickness in the short period 3x3 AlAs/GaAs superlattice system, B. Roughani, J. G. Pellegrino, D. N. Talwar, S. B. Qadri, D. Horowitz, N. V. Nguyen and P. M. Amirtharaj, 1994 Fall Meeting of the Materials Research Society, Boston
  - 37 Identification of intrinsic defects in GaAs grown by molecular beam epitaxy at low temperature, D. N. Talwar and P. W. Yu, Bulletin of American Physical Society, Vol. 39, 149 (1994).
  - 38 The 1.356 eV Exciton bound to deep antisite double donor  $P_{in}$  in InP, P. W. Yu, D. N. Talwar, James Toney, H. Q. Hu and C. W. Tu, Bulletin of American Physical Society, Vol. 39, 894 (1994).
  - 39 Inclusion of X-points into the effective bond orbital model for improved superlattice calculations, John P. Loehr and D. N. Talwar, Fourth Conference on Computational Research on Materials, Chestnut Rooms, Lakeview Resort and Conference Center, Morgantown, West Virginia (May 11-13, 1994).
  - 40 Principal strain tensor elements along hhk oriented cubic crystals : an application to ZnSe-based heterostructures, T. D. Fang, D. N. Talwar, N. C. Giles, SPIE International Symposium on Optical Engineering in Aerospace Sensing, Spring Meeting, Orlando Florida (April 4-8, 1994).
  - 41 Raman scattering studies of impurity modes in 3C-SiC: Theory and Experiment, D. N. Talwar and Z. C. Feng, XIV International Conference on Raman spectroscopy, Hong Kong (Aug. 22-26, 1994).
  - 42 Raman scattering from InAs-GaSb superlattices, Z. C. Feng, L. S. Kim, D. N. Talwar, H. Munekata, L. L. Chang, and Leo Esaki, XIV International Conference on Raman spectroscopy, Hong Kong (Aug. 22-26, 1994).
  - 43 Theory of impurity vibrations in cubic boron nitride and boron phosphide, D. N. Talwar, in Applied Diamond Conference (NIST Gaithersburg, August 21-24, 1995).
  - 44 Energetic states of isolated native defects in cubic boron pnictides, D. N. Talwar, N. Badi, A. Bousetta and A. Bensaoula in Applied Diamond Conference (NIST Gaithersburg August 21-24, 1995).
  - 45 Effect of tunneling current on the absorption coefficient of double quantum wells, D. N. Talwar and Gdfrey Gumbs, Bulletin of American Physical Society, San Jose, California (March 1995).
  - 46 Raman scattering spectroscopy in GaAs/GaAlAs superlattices, D. N. Talwar, EXMATEC, Freiburg, Germany (May 12-15, 1996).
  - 47 Phonons in GaN/AlN superlattices, D. N. Talwar, Low Dimensional Structures and Devices (LDSD'97), Lisbon, Portugal (May 19-21, 1997).
  - 48 Site selectivity of defects in III-V compounds by local mode spectroscopy and model calculations: D. N. Talwar, Invited talk presented at the Summer School on ADVANCES IN ENERGY TRANSFER PROCESSES, Advanced Study Institute, Ettore Majorana Center – Erice, Sicily, Italy, June 17 – July 1, 1999.
  - 49 Properties of low dimensional solids, Invited talk presented at Moti Lal Nehru Regional Engineering College, Allahabad, Dec. 19, 1999.
  - 50 Superlattice structure based detectors, Invited talk presented at Applied Physics, Allahabad University, Allahabad, Dec. 20, 1999.
  - 51 Characterization of defects in semiconductors by photoluminescence techniques: D. N. Talwar, Invited talk presented at the International Summer School of Atomic and

- Molecular Spectroscopy: 13<sup>th</sup> Workshop: ADVANCED TOPICS IN LUMINESCENCE SPECTROSCOPY, Ettore Majorana Center – Erice, Sicily Italy (July 23-29 2000).
- 52 Influence of doping on the dynamical properties of III-V-N by Raman scattering, infrared absorption and model calculations, Devki N. Talwar, Invited talk presented at the International Conference on Materials for Advanced technologies (ICMAT 2001, July 1 – 6 organized by Materials Research Society, Singapore).
  - 53 Tailoring type II strained layer InAs/InGaSb superlattices for long wavelength infrared detector Applications, Devki N. Talwar, Invited talk presented in the XI International Conference of Physics of Semiconductor Devices, New Delhi India December 2001.
  - 54 Thermal expansion coefficient and equation of state for cubic group-III nitrides, 26<sup>th</sup> Intl. Conference of Physics of Semiconductors, Edinburgh (July 29- Aug. 2, 2002).
  - 55 Pressure dependent phonon properties of cubic group III-nitrides, D. N. Talwar, Invited to present in the Xth High Pressure Physics of Semiconductor Conference, University of Surrey, UK, Aug. 5-9 (2002).
  - 56 Spectroscopic Properties of Cubic SiC on Si, Z. C. Feng, D. N. Talwar and I. Ferguson (Materials Research Society, 2002).
  - 57 Structural and vibrational properties of novel GaN<sub>x</sub>As<sub>1-x</sub>(P<sub>1-x</sub>) alloys and strained GaNAs/GaAs superlattices, Devki N. Talwar, Invited talk presented at PHOTONICS (Dec. 16-18 , 2002 Mumbai, India).
  - 58 Effects of composition on IR reflectivity and Raman scattering in n-type Al<sub>x</sub>Ga<sub>1-x</sub>As ternary alloys and AlGaAs/GaAs superlattices Devki N. Talwar, Contributed paper presented at PHOTONICS (Dec. 16-18 , 2002 Mumbai, India).
  - 59 Characterization of novel semiconductor materials, alloys and superlattices by far-infrared and Raman scattering spectroscopy and model calculations: Devki N. Talwar Tutorial presented at Tata Institute of Fundamental Research (December 21, 2002, Mumbai, India).
  - 60 In Pursuit of the Ultimate Cheap White Light, Devki N. Talwar Graduate School Research presentation at Indiana University of Pennsylvania ( Nov. 7, 2002).
  - 61 Structural and vibrational properties of dilute GaN<sub>x</sub>As<sub>1-x</sub>(P<sub>1-x</sub>), D. N. Talwar, 11<sup>th</sup> International Conference on Narrow Gap Semiconductors, Buffalo, New York (June 16-20 2003).
  - 62 Modeling and simulation of phonon-assisted defect features in CVD grown 3C-SiC/Si(100), D. N. Talwar and Z. C. Feng, International Conference on Materials of Advanced Technology (ICMAT, Dec. 7-12, 2003, Singapore).
  - 63 Reflectivity and Raman scattering in GaN<sub>x</sub>As<sub>1-x</sub> (GaN<sub>x</sub>P<sub>1-x</sub>) ternary alloys, Devki N. Talwar, Invited talk presented at International Conference on Communication, Devices and Intelligent Systems (CODIS Jan. 8-10, 2004, Kolkata, India)
  - 64 Optoelectronic properties of group III nitrides, Devki N. Talwar, Invited talk presented at the Summer School on Advances In Energy Transfer Processes, Advanced Study Institute, Ettore Majorana Center – Erice, Sicily, Italy (June, 3 2004).
  - 65 Simulation of pressure dependent phonon properties of zinc-blende Silicon Carbide (contributed paper D. N. Talwar and Z. C. Feng, in the International Conference on Raman Scattering, Australia, Aug. 2004).
  - 66 Novel III-V-N based long wavelength laser material structures–fabrication and characterization, D. N. Talwar (Invited talk) 7<sup>th</sup> International Conference on Optoelectronics, Fiber Optics, and Photonics, (Kochi, Dec. 9-11, 2004).



- 67 Anomalous pressure dependent properties of cubic silicon carbide, D. N. Talwar (Invited presentation International Symposium on Advanced Materials and Processing ISAMAP2K4, Dec. 6-8, 2004).
- 68 Effects of nitrogen on the optical properties of novel dilute III-V-N alloys, D. N. Talwar (Invited talk : Asia-Pacific Microwave Conference APMC-2004, Dec. 15-18, 2004).
- 69 Emerging SiC : Growth, Characterization and Physics of defects in heteroepitaxial materials, D. N. Talwar (International Workshop on the Physics of Semiconductors and Devices, Dec. 14<sup>th</sup> – 17<sup>th</sup>, 2005, New Delhi).
- 70 Wide bandgap novel Be-chalcogenide materials, heterostructures: Physics and Applications, D. N. Talwar (Invited talk at Photonics in Hyderabad Dec. 14- 17, 2006).
- 71 Assessing the preferential chemical bonding of nitrogen in novel dilute III-As-N, D. N. Talwar (Invited talk at National Physical Laboratory, New Delhi Dec. 22<sup>nd</sup>, 2006)
- 72 Understanding Anomalous Phonon Properties of SiC by Spectroscopic Methods and Simulations, D. N. Talwar and Z. C. Feng (Invited talk at International Conference on Electronic and Photonic Materials, Devices and Systems Jan. 4<sup>th</sup>- 6<sup>th</sup>, 2007, Kolkata).
- 73 Chemical bonding of nitrogen in dilute InAsN and high In-content InGaAsN, D. N. Talwar (International Conference on Superlattices, Nano-structures and Nano Devices, July 30<sup>th</sup> – Aug. 4<sup>th</sup>, 2007, Istanbul).
- 74 Applications of dilute III-As-N's in Optoelectronic Devices, D. N. Talwar (International workshop on Mathematical Applications in Science and Technology, Dec. 19<sup>th</sup>- 22<sup>nd</sup>, 2007, Pantnagar).
- 75 Computational methods in characterizing materials, D. N. Talwar (CONVERGENCE 2007, Ramjas College, Dec. 15<sup>th</sup> – 18<sup>th</sup>, 2007, New Delhi)
- 76 Study of Microscopic Structures in dilute III-N-As in Third International Conference on Optical, Optoelectronic and Photonic Materials and Applications" ICOOPMA 2008, Edmonton, AB Canada (July 20-25, 2008).
- 77 Nanotechnology: Searching for Novel Materials including Metamaterials, D. N. Talwar, 1<sup>st</sup> Science Conclave with Nobel Laureates, Indian Institute of Information Technology, Dec. 15-21, 2008 Allahabad, India.
- 78 Long wavelength IR detectors, D. N. Talwar, 1<sup>st</sup> Science Conclave with Nobel Laureates, Indian Institute of Information Technology, Dec. 15-21, 2008 Allahabad, India.
- 79 Type-II superlattice based sensors and detectors, D. N. Talwar, Invited, AOMD2008, Dec. 22-24, 2008 Banaras Hindu University, Varanasi.
- 80 Nanotechnology for growing Energy needs, D. N. Talwar, Honored Guest 2<sup>nd</sup> Science Conclave with Nobel Laureates Dec. 8-15, 2009, Allahabad, India
- 81 Introducing three Physics Nobel Laureate in the Science Conclave and their accomplishments, D. N. Talwar Honored Guest 2<sup>nd</sup> Science Conclave with Nobel Laureates Dec. 8-15, 2009, Allahabad, India
- 82 Novel type-II Semiconductors- Physics and Applications, D. N. Talwar, XV IWPSD-2009 (Invited talk) Dec. 15-19, New Delhi, India
- 83 Physics and applications of III-V-Ns, D. N. Talwar ELECTRO-2009 (Invited talk) Dec. 21-24, Varanasi, India

### **Colloquium and Seminars**

1. Infrared spectroscopy for characterizing defects in semiconductors, Solid State Electronics Directorate, Wright Patterson Air Force Base (1983).
2. Gallium isotopic effects on the local modes of amphoteric defects in GaAs, Sam Houston State University (1985).

3. Local vibrational modes in Semiconductors, Indiana University of Pennsylvania (1988).
4. Band gap engineering calculations of semiconductor superlattices", Department of Physics, Indiana University of Pennsylvania (November 2, 1990).
5. Infrared absorption spectroscopy and its applications, Department of Chemistry, Indiana University of Pennsylvania (November 30, 1990).
6. Band structure of superlattices : Applications to long wavelength infrared detectors Wright Patterson Air Force Base, Ohio (July 30, 1992).
7. Passivation of shallow and deep impurity levels in III-V compound semiconductors : A study using FTIR spectroscopy and model calculations, Space Vacuum Epitaxy Center - University of Houston (August 23, 1991).
8. Assessing the role of hydrogen, oxygen and the dopants in III-V compound semiconductors by infrared spectroscopy, Keynote speaker at the Society of Applied Spectroscopy, Waverly, N. Y. (September 19, 1991).
9. Passivation of Deep levels in Semiconductors, Physics Department, Indiana University of Pennsylvania (October 18, 1991).
10. Novel Long Wavelength IR Detectors, Indiana University of Pennsylvania (Oct. 8 1993)
11. Electronic properties of defects in Semiconductors, Adam Mickiewicz, University, Poznan, Poland (June, 15 1997).
12. InAs/InAsSb based novel infrared detectors, Guest Speaker, Engineering Club, Marshal University, Huntington, West Virginia (March, 20, 1998).
13. Semiconductor superlattices: Physics and Applications, CEERI, Pilani, India (June 1998).
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