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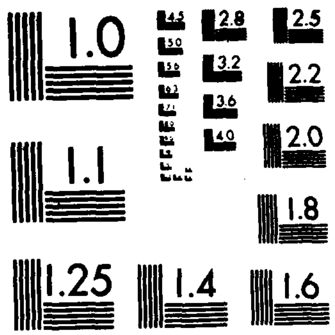

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SUBMICRON HETEROSTRUCTURES

OF DILUTED MAGNETIC SEMICONDUCTORS

ANNUAL REPORT

1986-87

N00014-86-K-0706

The Principal Investigators along with their co-investigators are continuing to maintain high visibility in the area of II-VI semiconductors and their heterostructures with special emphasis and focus on the diluted magnetic semiconductors (DMS's). The enclosed list of publications during 1986-1987 documents the high level of activity and the interactive climate which prevails in the Consortium. The enclosed list of invited talks, seminars and colloquia, and contributed talks shows that the semiconductor community continues to have intense interest in the area of focus of the Consortium.

During 1986-1987 the DARPA/URI on Submicron Heterostructures of Diluted Magnetic Semiconductors convened three meetings of the Principal Investigators, Members of the Advisory Panel and Drs. J.D. Murphy and Kristl Hathaway.

1. DARPA/URI Consortium Meeting
   Boston, Massachusetts
   December 3, 1986

2. DARPA II-VI MATERIALS & PROCESSING CONFERENCE
   Washington, DC
   April 7-9, 1987

3. Fall Meeting of the DARPA/URI Consortium
   Purdue University, W. Lafayette, IN
   November 4-6, 1987

(I) Growth of DMS heterostructures and their device potential

(a) MBE growth of DMS films and multilayered structures (Schetzina/Cook)

Considerable progress has been made at North Carolina State University (NCSU) in the development of photoassisted molecular beam epitaxy. A number of CdTe and CdMnTe films doped with In have been grown and studied. Mobilities as large as 2500 $cm^2/(V\text{-}s)$ have been obtained for CdTe films at low temperatures. Reproducible carrier concentrations ranging from 6×10^{15} to 7×10^{17} cm^{-3} have been obtained by systematic variation of the In oven temperature. P-type CdTe:Sb films have been successfully prepared with room temperature hole concentrations of 3×10^{18} cm^{-3} and hole mobilities of 81 $cm^2/(V\text{-}s)$.

Double-crystal x-ray diffraction studies indicate that the doped CdTe epilayers have a high degree of structural perfection. X-ray rocking curves as narraow as FWHM(400)=18 arc sec have been obtained for CdTe:In films grown on (100) CdTe substrates. This FWHM is comparable to the best ever obtained for CdTe epilayers grown by any technique.

The successful doping of CdTe films chemically compatible and closely lattice matched with HgCdTe, may provide the basis for a planar monolithic device technology featuring integration of HgCdTe focal plane arrays with op-board signal processing based on CdTe devices. In connection with the development of such a technology, a number of mask sets for photolithography have been developed at NCSU which define Schottky diodes, p-n junction diodes, field effect transistors, bipolar transistors, tunnel structures, charge coupled devices for signal readout of focal plane arrays, photodiode-transistor amplifier circuits and other masks for specialized optoelectric devices.

At NCSU, CdTe MESFET devices have been recently fabricated and tested. Depletion-mode FET structures with 5μm and 100μm gate lengths showed excellent Schottky diode characteristics, with some diode structures displaying reverse breakdown voltages as large as 14V.

(b) Pseudormorphic ZnSe/GaAs MISFET Devices (Gunshor/Kolodziejski/Melloch/Otsuka and co-workers)

ZnSe (a zincblende semiconductor with a room temperature bandgap of 2.7ev) is used as the insulator in a working GaAs MISFET device. A coherent, dislocation-free ZnSe/GaAs heterointerface has been obtained via the molecular beam epitaxy (MBE) of pseudomorphic ZnSe onto "as-grown" GaAs MBE epilayers. The small (0.25%) lattice constant mismatch between ZnSe and GaAs allows for the growth of 1000Å insulating layers devoid of strain-relieving misfit dislocations. Dramatic differences are seen in the nucleation of ZnSe onto MBE-grown GaAs epilayers compared to typical use of bulk GaAs substrates. Nucleation of ZnSe onto bulk substrates occurs as three-dimensional islands coalesce to form the insulating layer, whereas nucleation on MBE-grown epilayers results in a layer-by-layer growth. High resolution transmission electron microscopy examining the interfacial region of the pseudomorphic ZnSe/GaAs epilayer heterojunction confirms the existence of the coherent interface such that the lattice constant in the plane of the layers is the same for the two materials. Having the capability of achieving a nearly perfect epitaxial interface has allowed for the fabrication of a GaAs MISFET devices. MIS capacitors were used to determine the n-channel thickness and doping. The I-V characteristics of the MISFET devices were measured at room temperature and 77K. This II-VI/III-V heteroepitaxial interface has all the potential of the AlGaAs/GaAs structure with the additional advangtage of larger band discontinuities.

(c) DMS based LED and injection laser heterostuctures (P. Becla, Francis Bitter National Magnet Laboratory, MIT)

Infrared LED and injection laser heterostructures of HgMnTe and HgCdTe have been fabricated. Spontaneous emission from the LED's with peak at 5.3μm has been observed upto 140K in the pulsed mode and 90K in the CW mode. Stimulated emission with threshold current density of $\sim$1200 A/cm^2 (pulsed) has been observed at 5.4μm from laser heterostructures at 77K.

(II) Growth of bulk and layer structures of DMS's

The Atomic Layer Epitaxy (ALE) system has been ordered (Furdyna-Notre Dame); it is expected to be "on the air" by mid-November 1987. The new MBE facility at Purdue (Gunshor/Kolodziejski) is now operational and superlattices are being fabricated. The MBE facilities at NCSU (Schetzina) is producing a variety of doped and undoped epilayers and superlattices. The Purdue Central Crystal Preparation Facility (Furdyna/Ramdas/Debska) supplies highly purified elements to the MBE facilities at Purdue and NCSU. Growth of bulk DMS continues at Purdue (Debska), Francis Bitter National Magnet Laboratory (Becla) and NCSU (Bachmann). Insulator growth studies of DMS material (Lucovsky) are being initiated; preliminary studies of SiO_2 growth on CdTe wafers by remote plasma-assisted CVD are just now getting underway. Furdyna and Debska have succeeded in preparing DMS ternary alloys based on Co (e.g. $Cd_{1-x}Co_xSe$). This significantly expands the scope of DMS's.

(III) Instrumentation for physical investigation/characterization

(a) Transmission electron microscope
(N. Otsuka)

The installation of a JEM 2000 EX high resolution electron microscope has been completed. A point resolution, 2.5Å, has been obtained with the standard pole piece of the objective lens (spherical aberration coefficient C_s: 1.4 mm). By November 1987, this pole piece will be replaced by an ultra-high resolution pole piece (C_s: 0.7 mm) which is expected to give a point resolution, 2.1Å.

(b) Electrical characterization of MBE films
(Gunshor/Reifenberger)

The electrical characterization of the MBE films grown at Purdue by Professors Gunshor and Kolodziejski is underway in Reifenberger's laboratory. A new high impedance electrometer system has been developed that permits the rapid and accurate measurement of the resistivity and Hall coefficient of the wide band-gap materials. Measurements spanning a wide range of temperatures will be possible in the near future.

(c) Scanning Tunneling Microscope (Dow and co-workers)

The STM at Notre Dame is operational. It has been tested on gold and graphite, providing routinely images with resolution below 10Å. Work on the reduction of noise and increase in resolution is in progress.

(d) Fourier transform spectrometer (Ramdas)

The spectrometer manufactured by BOMEM has been delivered to Purdue (Ramdas). The spectrometer currently capable of a maximum resolution of 0.002 cm^{-1} and a spectral coverage 5-10,000 cm^{-1}, has been installed . Work on exit optics to accommodate absorption and reflectivity measurements and entrance optics to enable photoluminescence is in progress.

(IV) Physical investigations

(a) Spin-flip Raman scattering from $Cd_{1-x}Mn_xTe$:In epilayers and modulation doped $Cd_{1-x}Mn_xTe$:In/CdTe superlattices grown by photo-assisted molecular beam epitaxy (Ramdas/Schetzina and co-workers)

The observation of the 's-d' exchange interaction enhanced spin-flip Raman shift from electrons in $Cd_{1-x}Mn_xTe$:In epilayers and modulation doped $Cd_{1-x}Mn_xTe$:In/CdTe superlattices is studied to demonstrate successful, controlled doping during the growth by photoassisted molecular beam epitaxy. Resonance Raman enhancement; confinement of electrons to the CdTe wells in the superlattices; the penetration of the electronic wave functions into the $Cd_{1-x}Mn_xTe$ barriers; the spatial location of the intentionally introduced donors, the strength of the 's-d' interactions;....., these are the issues addressed in the experiments.

(b) Photoluminescence and excitation spectroscopy

(i) Doped epilayers and superlattices (Schetzina)

Extensive low temperature photoluminescence and excitation luminescence experiments have been completed. On the basis of these measurements along with variable-temperature Hall effect data, the ionization energy of In donors in CdTe films has been determined to be 14.8±0.2 meV. From an analysis of the luminescence data for CdTe:Sb films, the ionization energy of Sb acceptors is estimated to be 65±2 meV.

(ii) Bandoffsets in the CdTe/(Cd,Mn)Te heterostructures (Nurmikko/Gunshor/Kolodziejski)

Magneto-optical studies have been carried out in order to pin down the question of bandoffsets in (100) oriented CdTe/(Cd,Mn)Te quantum wells. This information is critical in the design of future electro-optical devices based on this heterostructure. The experimental work includes the use of photoluminescence excitation spectroscopy and Resonant Raman spectroscopy to make careful measurements of lowest confined particle excitonic transitions in a CdTe quantum well. It is found that in order to accurately determine the small valence band offset, it is imperative to account properly for the exciton Coulomb interaction in this unusual case of a quasi-2D electron and and quasi-3D hole. A variational theory has been developed which extends the treatment of excitons beyond the usual case of good confinement for both quasi-particles. As a consequence it is determined that the valence band offset is mainly determined by the lattice mismatch strain extrapolating to zero (within 10 meV) is the ideal limit of a strain free structure.

(iii) Influence of electric fields on excitons in ZnSe/(Zn,Mn)Se Quantum Wells (Nurmikko/Gunshor/Kolodziejski)

Nurmikko and co-workers have applied sizable electric fields, at values above the classical field ionization threshold for excitons in bulk ZnSe, to demonstrate substantial Stark effects in the recombination spectra of a ZnSe/(Zn,Mn)Se quantum well. The measured shifts have been correlated with theory which successfully considers the added influence of the electron-hole Coulomb field on the net electric field in the structure. Furthermore, in a multiple quantum well structure grown on a n+ GaAs substrate, proper choice in the polarity of the applied field can inject hot electrons into the adjacent wide gap structure. They have demonstrated this by observing the yellow electroluminescence from the Mn-ion d-electron transition at the (Zn,Mn)Se layers of the superlattice, excited by the hot electrons emitted from the GaAs substrate.

(iv) P- and As- doped CdMnTe (Becla/Schetzina and co-workers)

Photoluminescence and infrared absorption studies on P- and As- doped CdMnTe clearly show acceptor bound magnetic polarons (BMP's) whose energies are fitted using self-consistent numerical calculations. At liquid helium temperatures the acceptor-BMP's have total magnetic moments as large as 120 Bohr magnetons.

(c) Non-linear optical effects in DMS's (Wolff/Yuen/Schetzina/Cook and co-workers)

A large value of 5×10^{-4} for third-order nonlinear susceptibility $\chi^{(3)}$ with response time in the picosecond range has been measured at 10.6 μm in HgTe and HgMnTe at ~300 K. This is attributed to interband population modulation. It does not saturate below 1 MW/cm^2.

Resonance scattering levels in the conduction band of HgCdSe:Fe have shown to yield large values for $\chi^{(3)}$ due to the energy dependence of the scattering mechanism. Further enhancement of $\chi^{(3)}$ can be obtained if the resonance scattering level lies closer to the Fermi energy.

Narrow bandgap (50-250 meV) HgMnTe shows strongly nonlinear current-voltage (I-V) characteristics. Bulk samples display a negative differential resistivity that can be attributed to thermal causes. However, pulsed current studies on epilayer samples indicate that there is a nonlinear component due to an electronic effect. The study of the I-V curves as a function of magnetic field will shed light on the acceptors binding energy in these materials.

(d) sp-d and d-d exchange interaction in DMS's.

(i) Ab initio theory of sp-d and d-d exchange interaction in DMS's (Ehrenreich and co-workers)

An ab initio theory for the sp-d and d-d exchange interactions of CdMnTe was completed and found to be in good agreement with experiment. The calculation includes the realistic band structure. The implementation of the superexchange formalism is believed to be as good as the best that has been previously given for other materials. A simple model has been constructed using these results, which permits accurate estimates of exchange parameters in other DMS. The chemical trends observed so far have been accurately predicted.

The anisotropic superexchange (Dzyaloshinski-Moriya interaction) is being calculated using the same formalism as above, but including spin-orbit interactions. The results are being used to interpret the EPR experimental linewidths observed by Furdyna's group.

(ii) Raman scattering from antiferromagnetically coupled Mn^{2+} pairs in $Cd_{1-x}Mn_xS$ and $Cd_{1-x}Mn_xSe$ (Rodriguez/Ramdas/Aggarwal)

Isolated pairs of antiferromagnetically coupled magnetic ions posses a series of energy levels whose separation is determined by the nearest-neighbor exchange consant J_{NN}. We report Raman transitions between these energy levels in $Cd_{1-x}Mn_xS$ and $Cd_{1-x}Mn_xSe$. At the lowest temperatures, the ground to first excited state transition is observed and allows direct measurement of J_{NN}/k_B: -10.6 ± 0.2 K in $Cd_{1-x}Mn_xS$ and -8.1 ± 0.2 K in $Cd_{1-x}Mn_xSe$. Transitions to higher excited states occur at higher temperatures.

(iii) Low-temperature magnetization (Shapira/Aggarwal/Becla/Furdyna/Heiman)

The low temperature magnetization of DMS's exhibits steps at high magnetic fields. The steps are due to energy level crossing for paris of nearest-neighbor Mn spins. The steps yield the Mn-Mn exchange constant and the concentration of pairs in the crystal. During the last year we have studiesd the magnetization steps in $Hg_{1-x}Mn_xTe$ and $Cd_{1-x}Mn_xTe$. The latter study complements the study of the magnetization steps by spin-flip Raman scattering.

(iv) Bound magnetic polaron. (Isaacs/Heiman/Furdyna and co-workers)

Large bound magnetic polaron energies have been observed in CdMnSe using inelastic light scattering from donor spin-flip transitions to temperatures as low as 0.4 K. Spin-flip transitions to fields of 30 T show magnetization steps in CdMnTe

(3 steps) and CdMnSe (2 steps).

(v) Stannite DMS's
(Shapira/Wolff and co-workers)

Mean-field calculations show that ordered-alloy DMS have enhanced magnetic properties: 5 times for linear chains of Mn and 30 times for stannite-type Mn ordering.

Studies of II-VI DMS have shown that the antiferromagnetic interaction is mainly due to interactions between nearest-neighbor Mn spins. The wurtz-stannite structure of compounds like $Cu_2Zn_{1-x}Mn_xGeS_4$ is similar to the wurtzite and zinc-blende structures of the II-VI DMS's, but in this structure the Mn ions are never nearest-neighbor cations. It was therefore suggested by Wolff and Ram-Mohan that the antiferromagnetic interaction in this structure will be reduced substantially relative to that in the analogous II-VI materials. This suggestion has been confirmed experimentally in measurements of the susceptibility and magnetization of CVT-grown single crystals of $Cu_2Zn_{1-x}Mn_xGeS_4$.

(vi) Temporal response of Mn^{2+} spin system in DMS's
(Furdyna and co-workers)

Furdyna and co-workers have discovered that the temporal response of the exchange-coupled Mn^{2+} spin system in $Cd_{1-x}Mn_xTe$ significantly speeded up by addition of a small atomic fraction of Fe into the system. This response should be of considerable interest in the application of DMS's in fast magneto-optical devices.

(e) Faraday Effect in DMS's
(Ehrenreich)

The magneto-optical figure of merit for DMS is being examined and compared with that of other materials such as YIG. For the infra-red range appropriate for CdMnTe ($\sim 0.62 \mu m$), the DMS are probably the best candidate materials for isolators and modulators, in agreement with the assessment of Gunshor and collaborators. A complementary examination of the promise of IR Dectectors involving the new high-T_c superconducting materials is currently in its beginning stages.

(f) Structural studies

(i) Twinning and dislocations
(Furdyna and co-workers)

A systematic program of structural studies of DMS, incuding the study of twinning and dislocations, has been launched. In addition to providing basic structural knowledge, this program will help in evaluating ternary and quaternary substrate candidates for epitaxy applications.

(ii) Exotic DMS's: their band structure
(Dow/Newman and co-workers)

Kathie Newman and associates have shown that Hg_xMn_xTe, for x=0.5, can have a chalcopyrite structure with a band gap approximately half that of the random alloy. They are now determining the stability of new ordered phases of alloys $A^{IV_{1-x}}B^{IV_x}C^{VI}$ having either cubic or hexagonal symmetry, using cluster variation methods. A local-density theory of MnTe has been worked out, and differs in its results from those of Zunger, supporting work by Ehrenreich.

(g) Electrostatic and magnetostatic modes in semiconductor superlattices
(Rodriguez and co-workers)

The propagation of acoustic phonons, optical phonons or of magnetostatic modes in the interface between two elastic, dielectric or magnetic media presents many phenomena of great physical interest. One of the simplest forms of interface modes is that consisting of waves traveling parallel to the interface and decaying exponentially into the adjoining media. A well known example is that of surface plasmons. The recent growing interest in superlattices has led to investigations of surface modes in these structures. A study was made of spin wave excitations propagating along the layers of superlattice and possessing the ordinary Bloch periodicity along the axis. The dispersion formula of such modes was obtained and applied to the antiferromagnetic state of superlattices formed by diluted magnetic semiconductors.

PUBLICATIONS
(1986-87)

1. S. Datta, M. Yamanishi, R.L. Gunshor and L.A. Kolodziejski, "Excitons in II-VI Multiquantum Well Systems", *Proceedings of the Meeting on Excitons in Confined Systems,* held at Rome, April 13-16, 1987 (to be published by Springer-Verlag).

2. T.M. Giebultowicz, J.J. Rhyne and J.K. Furdyna, "Mn-Mn Exchange Constants in Zinc-Manganese Chalcogenides", *Proceedings of 31st Annual Conf. on Magnetism and Magnetic Materials,* Baltimore, MD, November 1986 (to be published in J. Appl. Phys. 1987).

3. T.M. Giebultowicz, J.J. Rhyne, J.K. Furdyna and U. Debska, "Neutron Diffraction Study of Wurtzite-Structured Diluted Magnetic Semiconductor $Zn_{0.45}Mn_{0.55}Se$", *Proceedings of 31st Annual Conf. on Magnetism and Magnetic Materials,* Baltimore, MD, November 1986 (to be published in J. Appl. Phys. 1987).

4. J.K. Furdyna and N. Samarth, "Magnetic Properties of Diluted Magnetic Semiconductors", *Proceedings of 31st Annual Conf. on Magnetism and Magnetic Materials,* Baltimore, MD, November 1986 (to be published in J. Appl. Phys. 1987).

5. J.K. Furdyna, J. Kossut and A.K. Ramdas, "Quantum Wells and Superlattices of Diluted Magnetic Semiconductors", *Proceedings of NATO Advanced Research Workshop on Optical Properties of Narrow Gap Low Dimensional Structures,* St. Andrews, Scotland, July 29-August 1, 1986 (in press).

6. M. Dobrowolska, Z. Yang, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magnetoabsorption in HgTe-CdTe and $Hg_{1-x}Mn_xTe$ Superlattices", J. Vac. Sci. Technol. (in press).

7. H. Luo, M. Dobrowolska, Z. Yang, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magnetospectroscopy of HgTe and $Hg_{1-x}Mn_xTe$ Epilayers Grown by MBE", J. Vac. Sci. Technol. (in press).

8. Z. Yang, M. Dobrowolska, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magnetoabsorption in $Hg_{1-x}Mn_xTe/HgTe$ Superlattices", *Proceedings Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the Materials Research Society,* December 1-3, 1986, Boston (in press).

9. B.A. Bunker, W.-F. Pong and J.K. Furdyna, "EXAFS Determination of Bond Lengths in $Zn_{1-x}Mn_xSe$", *Proceedings Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the Materials Research Society,* December 1-3, 1986, Boston (in press).

10. J. Kossut and J.K. Furdyna, "Effects of Exchange Interaction in Diluted Magnetic Semiconductor Quantum Wells", *Proceedings Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the Materials Research Society,* December 1-3, 1986, Boston (in press).

11. F. Pool, J. Kossut, U. Debska, R. Reifenberger and J.K. Furdyna, "Electronic Transport Properties of $Hg_{1-x}Fe_xSe$", *Proceedings Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the Materials Research Society,* December 1-3, 1986, Boston (in press).

12. D.U. Bartholomew, J.K. Furdyna and A.K. Ramdas, "Interband Faraday Rotation in Diluted Magnetic Semiconductors" $Zn_{1-x}Mn_xTe$ and $Cd_{1-x}Mn_xTe$", Phys. Rev. B 34, 6943 (1986).

13. R.L. Aggarwal, S.N. Jasperson, P. Becla and J.K. Furdyna, "Optical Determination of the Antiferromagnetic Exchange Constant Between Nearest-Neighbor Mn^{2+} ions in $Zn_{0.95}Mn_{0.05}Te$", Phys. Rev. B 34, 5894 (1986).

14. N. Otsuka, C. Choi, Y. Nakamura, S. Nagakura, R. Fischer, C.K. Peng and H. Morkoc, "HREM of Misfit Dislocations in the GaAs/Si Epitaxial Interface", Appl. Phys. Lett. 49, 277 (1986).

15. N. Otsuka, C. Choi, L.A. Kolodziejski, R.L. Gunshor, R. Fischer, C.K. Peng, H. Morkoc, Y. Nakamura and S. Nagakura, "Study of Heteroepitaxial Interfaces by Atomic Resolution Electron Microscopy", J. Vac. Sci. Tech. B 4, 896 (1986).

16. C. Choi, N. Otsuka, L.A. Kolodziejski and R.L. Gunshor, "HREM of II-VI Compound Strained-Layer Superlattices", *Proceedings of Materials Research Society,* 56, 235 (1986).

17. N. Otsuka, C. Choi, L.A. Kolodziejski and R.L. Gunshor, "Electron Diffraction Study of Multilayer Structures with Partially Coherent Illumination", *Proceedings of Materials Research Society,* 62, 65 (1986).

18. L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, W.M. Becker and S. Datta, "Wide Gap II-VI Superlattices", IEEE Trans. J. Quantum Electronics, QE-22, 1666 (1986).

19. K.A. Harris, S. Hwang, D.K. Blanks, J.W. Cook, Jr., J.F. Schetzina and N. Otsuka, "Growth of HgCdTe and Other Hg-Based Films and Multilayers by Molecular Beam Epitaxy", J. Vac. Sci. Technol. A 4, 2061 (1986).

20. T. Onozuka, N. Otsuka and H. Sato, "High Resolution Electron Microscopy of the Triply Incommensurate Phase of $2H-TaSe_2$", Phys. Rev. B 34, 3303 (1986).

21. R.L. Gunshor, L.A. Kolodziejski, M.R. Melloch, M. Vaziri, C. Choi and N. Otsuka, "Nucleation and Characterization of Pseudomorphic ZnSe Grown on Molecular Beam Epitaxially Grown GaAs Epilayers", Appl. Phys. Lett. 50, 200 (1987).

22. Y. Arakawa, J.S. Smith, A. Yariv, N. Otsuka, C. Choi, B.P. Gu and T. Venkatesan, "Transmission Electron Microscopy and Photoluminescence Study of Silicon and Boron Ion Implanted GaAs/GaAlAs Quantum Wells", Appl. Phys. Lett. 50, 92 (1987).

23. C. Choi, N. Otsuka, G. Munns, R. Houdre, H. Morkoc, S.L. Zhang, D. Levi and M.V. Klein, "Effect of In-Situ and Ex-Situ Annealing on Dislocations in GaAs on Si Substrates", Appl. Phys. Lett. 50, 992 (1987).

24. R. Venkatasubramanian, N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of the Growth of ZnSe by MBE", *Proceedings of 1986 MRS Fall Meeting* (to be published).

25. R. Venkatasubramanian, N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of the Growth of ZnSe by MBE", *Proceedings of the 1987 SPIE Symposium* (to be published).

26. J. Klem, D. Huang, H. Morkoc, Y.E. Ihm and N. Otsuka, "Molecular Beam Epitaxial Growth and Low Temperatures Optical Characterization of $GaAs_{0.5}$ on InP", Appl. Phys. Lett. 50, 1364 (1987).

27. Y.R. Lee, A.K. Ramdas and R.L. Aggarwal, "Energy Gap, Excitonic and Internal Mn^{2+} Optical Transitions in Mn-Based II-VI Diluted Magnetic Semiconductors", *Proceedings of the 18th International Conference on the Physics of Semiconductors,* Stockholm, Ed: O. Engström, (World Scientific, Singapore 1987) P. 1759

28. D.U. Bartholomew, E.-K. Suh, S. Rodriguez, A.K. Ramdas and R.L. Aggarwal, "Raman Scattering from Antiferromagnetically Coupled Mn^{2+} Ion Pairs in $Cd_{1-x}Mn_xS$ and $Cd_{1-x}Mn_xSe$", Solid State Commun. 62, 235 (1987).

29. A.K. Arora and A.K. Ramdas, "Resonance Raman Scattering from Defects in CdSe", Phys. Rev. B 35, 4345 (1987).

30. A.K. Arora, D.U. Bartholomew, D.L. Peterson and A.K. Ramdas, "Raman Scattering Study of the High-Pressure Phase Transition in $Cd_{1-x}Mn_xTe$", Phys. Rev. 35, 7966 (1987).

31. K.S. Wong, W. Hayes, J.F. Ryan and A.K. Ramdas, "Time-Resolved Photoluminescence Study of Exciton Localization in $Cd_{1-x}Mn_xTe$", J. Phys. C. 19, L829 (1986).

32. Y.R. Lee, A.K. Ramdas, F.A. Chambers, J.M. Meese and L.R. Ram Mohan, "Piezomodulated Electronic Spectra of Semiconductor Heterostructures: $GaAs/Al_xGa_{1-x}As$ Quantum Well Structures", Appl. Phys. Lett. 50, 600 (1987).

33. A.K. Ramdas and S. Rodriguez, "Raman Scattering by Magnetic Excitations in Diluted Magnetic Semiconductors", *Proceedings of the Materials Research Society,* Fall 1986 (in press).

34. S. Rodriguez and A.K. Ramdas, "Raman Scattering by Diluted Magnetic Semiconductors", Journal of Pure and Applied Chemistry (in press).

35. E.-K. Suh, D.U. Bartholomew, A.K. Ramdas, S. Rodriguez, S. Venugopalan, L.A. Kolodziejski and R.L. Gunshor, "Raman Scattering from Superlattices of Diluted Magnetic Semiconductors", (to be published in Physical Review).

36. A.K. Arora, A.K. Ramdas, M.R. Melloch and N. Otsuka, "Interface Vibrational Raman Lines in $GaAs/Al_xGa_{1-x}As$ Superlattices", Phys. Rev. B 36, July 1987.

37. D.L. Peterson, A. Petrou, W. Giriat, A.K. Ramdas and S. Rodriguez, "Raman Scattering from the Vibrational Modes in $Zn_{1-x}Mn_xTe$", Phys. Rev. B 33, 1160 (1986).

38. E. Kartheuser and S. Rodriguez, "Deformation Potentials and the Electron-Phonon Interaction in Metals", Phys. Rev. B 33, 772 (1986).

39. S. Rodriguez and A.K. Ramdas, "Raman Scattering by Magnetic Excitations in Diluted Magnetic Semiconductors", *Proceedings of the Tenth International Conference on Raman Spectroscopy,* Eugene, OR, August 31-September 5, 1986, W.L. Peticolas and B. Hudson, editors (University of Oregon Press, Eugene, 1986) p. 7-1.

40. S. Gopalan, S. Rodriguez, J. Mycielski, M. Grynberg and A. Wittlin, "Electric-dipole Spin Resonance in n-type $Cd_{1-x}Mn_xSe$", Phys. Rev. B 34, 5466 (1986).

41. M. Cardona, N.E. Christensen, M. Dobrowolska, J.K. Furdyna and S. Rodriguez, "Spin Splitting of the Conduction Band of InSb Along [110]", Solid State Comm. 60, 17 (1986).

42. E. Kartheuser, L.R. Ram Mohan and S. Rodriguez, "Theory of Electromagnetic Generation of Acoustics Waves in Metals", Advances in Physics 35, 423 (1986).

43. F. Bassani, G.C. LaRocca and S. Rodriguez, "Inversion Asymmetry and Magneto-Optical Selection Rules in p-type Zinc-Blende Semiconductors", *Proceedings of the 18th International Conference on the Physics of Semiconductors,* O. Engström, editor (World Scientific, Singapore, 1987) p. 1709.

44. S. Rodriguez, "Parity Violation and Electron-Spin Resonance of Donors in Semiconductors" (to appear in Physica).

45. Z. Barticevic, M. Dobrowolska, J.K. Furdyna, L.R. Ram Mohan and S. Rodriguez, "Theoretical and Experimental Investigation of the Effective g factor of Donor-bound Electrons in InSb", Phys. Rev. B 35, 7464 (1987).

46. S. Rodriguez, A. Camacho and L. Quiroga, "Electrostatic and Magnetostatic Modes in Semiconductor Superlattices", (to appear in Superlattices and Microstructures).

47. A.V. Nurmikko, R.L. Gunshor and L.A. Kolodziejski, "Optical Properties of CdTe/CdMnTe Multiquantum Wells", Transactions on Quantum Electronics, QE-22(9), 1785 (1986).

48. L.A. Kolodziejski, R.L. Gunshor, A.V. Nurmikko and N. Otsuka, "RHEED Intensity Oscillations and the Epitaxial Growth of Quasi-2D Magnetic Semiconductors" (to be published in NATO ASI Series, Plenum Press, 1987).

49. Y. Hefetz, W.C. Goltsos, D. Lee, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Electronic Energy States and Relaxation in $Zn_{1-x}Mn_xSe$ Superlattices", Journal of Superlattices, Microstructures and Microdevices, 2, 455 (1986).

50. R.L. Gunshor, L.A. Kolodziejski, N. Otsuka, B.P. Gu, D. Lee, Y. Hefetz and A.V. Nurmikko, "2D Metastable Magnetic Semiconductor Superlattices", Journal of Superlattices, Microstructures and Microdevices, 1986.

51. L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, B.P. Gu, Y. Hefetz and A.V. Nurmikko, "Use of RHEED Oscillations for the Growth of 2D Magnetic Semiconductor Superlattices (MnSe/ZnSe)", Journal of Crystal Growth, 81, 491 (1987).

52. R.B. Bylsma, J. Kossut, W.M. Becker, L.A. Kolodziejski, R.L. Gunshor and R. Frohne, "Photoluminescence and Excitation Spectra of ZnMnSe Films and Superlattices Grown by MBE", Journal of Applied Physics 61, 3011 (1987).

53. T.C. Bonsett, M. Yamanishi, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Polarization Dependent Optical Absorption and Gain Spectra of (Cd,Mn)Te and (Zn,Mn)Se Multiple Quantum Well Structures", Applied Physics Letters, 51, (1987).

54. S.K. Chang, D. Lee, H. Nakata, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Frustrated Antiferromagnetism at the Heterointerfaces in a Semiconductor Superlattice: MnSe/ZnSe", (submitted to Physical Review Letters).

55. D.P. Munich, R.F. Pierret, L.A. Kolodziejski, M.R. Melloch and R.L. Gunshor, "Metal-Pseudomorphic ZnSe-GaAs (MIS) Structures: Electrical Characteristics" (submitted to Applied Physics Letters).

56. S.-K. Chang, A.V. Nurmikko, J.-W. Wu, L.A. Kolodziejski and R.L. Gunshor, "BandoffSets and Excitons in CdTe/(Cd,Mn)Te Quantum Wells", (submitted to Physical Review B).

57. Qiang Fu, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Electric Field Induced Shifts in Exciton Luminescence in ZnSe/(Zn,Mn)Se Superlattices" (submitted to Physics Letters).

58. Y.R. Lee, A.K. Ramdas, F.A. Chambers, J.M. Meese and L.R. Ram Mohan, "Piezomodulated Electronic Spectra of Semiconductor Heterostructures: $GaAs/Al_xGa_{1-x}As$ Quantum Well Structures" (to appear in the SPIE's 'Advances in Semiconductors and Semiconductor Structures', Bay Point, Florida, March 1987).

59. R.B. Bylsma, W.M. Becker, J. Kossut and U. Debska, "Dependence of Energy Gap on x and T in $Zn_{1-x}Mn_xSe$: The Role of Exchange Interaction", Phys. Rev. B 33, 8207 (1986).

60. J. Kossut and W.M. Becker, "Bound Magnetic Polarons in Diluted Magnetic Semiconductors: The High Temperature Regime", Phys. Rev. B 33, 1394

(1986).

61. L.A. Kolodziejski, R.L. Gunshor, R. Venkatasubramanian, T.C. Bonsett, R. Frohne, S. Datta, N. Otsuka, R.B. Bylsma, W.M. Becker and A.V. Nurmikko, "Summary Abstract: (100)-oriented Wide Gap II-VI Superlattices", J. Vac. Sci. Technol. B 4, 583 (1986).

62. D.R. Andersen, L.A. Kolodziejski, R.L. Gunshor, S. Datta, A.E. Kaplan and A.V. Nurmikko, "Nonlinear Excitonic Absorption in (Zn,Mn)Se Superlattices and ZnSe Films", Applied Phys. Lett. 48, 1559 (1986).

63. C.M. Maziar, M.E. Klausmeier-Brown, S. Bandyopadhyay, M.S. Lundstrom and S. Datta, "Monte Carlo Evaluation of Electron Transport in Heterojunction Bipolar Transistor Base Structures", IEEE Transactions on Electron Devices, ED-33, 881 (1986).

64. L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, S. Datta, W.M. Becker and A.V. Nurmikko, "Wide-Gap II-VI Superlattices", IEEE Transactions on Quantum Electronics, QE-22, 1666 (1986).

65. S. Bandyopadhyay, C.M. Maziar, S. Datta and M.S. Lundstrom, "An Analytical Technique for Calculating High Field Transport Parameters in Semiconductors", J. Appl. Phys. 60, 278 (1986).

66. S. Bandyopadhyay, M.E. Klausmeier-Brown, C.M. Maziar, S. Datta and M.S. Lundstrom, "A Rigorous Technique to Couple Monte-Carlo and Drift-diffusion Models for Computationally Efficient Device Simulation", IEEE Trans. on Electron Devices, ED-34, 392 (1987).

67. S. Bandyopadhyay, S. Datta and M.R. Melloch, "Aharonov-Bohm Effect in Semiconductor Microstructures - Novel Device Possibilities", Superlattices and Microstructures 2, 539 (1986). Also presented at the Second International Conference on Superlattices, Microstructures and Microdevices held at Göteborg, Sweden, August 17-20, 1986.

68. M. Cahay, M. McLennan, S. Datta and M.S. Lundstrom, "Importance of Space-charge Effects in Resonant Tunneling Devices", Appl. Phys. Lett. 50, 612 (1987).

69. S. Datta and S. Bandyopadhyay, "Aharonov-Bohm Effect in Semiconductor Microstructures", Phys. Rev. Lett. 58, 717 (1987).

70. N. Otsuka, Y.E. Ihm, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Transmission Electron Micsroscope Study of Hg-Based Multilayer

Structures", J. Vac. Sci. Tech. (to be published).

71. N. Otsuka, Y.E. Ihm, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Study of HgTe-CdTe Multilayer Structures by Transmission Electron Microscopy", *Proc. Mat. Res. Soc. Symp.*, 90 (1987).

72. N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of the Growth of ZnSe by MBE", *Proc. Mat. Res. Soc. Symp.*, 77 (1987).

73. N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of the Growth of ZnSe by MBE", *Proc. SPIE Symp.*, (1987).

74. J.R. Anderson, W.B. Johnson, D.R. Stone and J.K. Furdyna, "Large Negative Magnetoresistance of $Cd_{0.90}Mn_{.10}Se$", J. Phys. Chem. Solids 48, 481 (1987).

75. S.B. Quadri, E.F. Skelton, A.W. Webb, E.R. Carpender, M.W. Schaefer and J.K. Furdyna, "Investigation of the Pressure-induced B3-B1 Phase Transition in $Cd_{1-x}Mn_xTe$ ($0 \leq x \leq 0.70$)", Phys. Rev. B 35, 6868 (1987).

76. A. Wall, C. Caprile, A. Franciosi, M. Vaziri, R. Reifenberger and J.K. Furdyna, "Bonding and Stability in Narrow-Gap Ternary Semiconductors for Infrared Applications", J. Vac. Sci. Techn. A 4, 2010-13 (1986).

77. M. Vaziri and R. Reifenberger, "Angular Dependence of the Quantum Oscillations in the Diluted Magnetic Semiconductor $Hg_{1-x}Fe_xSe$", Phys. Rev. B 33, 5585 -89 (1986).

78. A. Wall, C. Caprile, A. Franciosi, R. Reifenberger and U. Debska, "New Ternary Semiconductors for Infrared Applications: $Hg_{1-x}Mn_xTe$", J. Vac. Sci. Techn. A 4, 818-22 (1986).

79. A. Franciosi, A. Wall, S. Chang, C. Caprile, P. Philip, F. Pool, R. Reifenberger and U. Debska, "Electronic Structure of New Narrow Gap Semimagnetic Semiconductors by Synchrotron Radiation Investigation", Vuoto XVI, 77-81 (1986).

80. F.S. Pool, J. Kossut, U. Debska and R. Reifenberger, "Reduction of Charge Center Scattering Rate in $Hg_{1-x}Fe_xSe$", Phys. Rev. B 35, 3900-09 (1987).

81. R. Reifenberger and J. Kossut, "Band Structure and Electronic Properties of Mercury Chalcogenide Alloys Containing Iron", J. Vac. Sci. Techn. (in press).

82. M.M. Miller and R. Reifenberger, "Spectral Analysis of de Haas-van Alphen Oscillations in $Hg_{1-x}Fe_xSe$" (submitted to Phys. Rev. B).

83. A. Wall, S. Chang, P. Philip, C. Caprile, A. Franciosi, R. Reifenberger and F. Pool, "A Photoemission Survey of the Electronic Properties of Ternary Semimagnetic Semiconductor Alloys", J. Vac. Sci. Techn. (in press).

84. K.C. Hass, B.E. Larson, H. Ehrenreich and A.E. Carlsson, "Magnetic Interactions in Diluted Magnetic Semiconductors", J. Magnetism and Magnetic Materials 54-57, 1283 (1986).

85. H. Ehrenreich and T.C. McGill, "U.S. Electronic Materials Competitiveness: The Crisis and Proposed Resolutions", DARPA Materials Research Council Report, 1986.

86. H. Ehrenreich, "Electronic Theory for Materials Science", Science 235, 1029 (1987).

87. R.J. Lempert, K.C. Hass and H. Ehrenreich, "Molecular Coherent-Potential Approximation for Zincblende Pseudobinary Alloys", Phys. Rev. B, 1987 (to be published).

88. K.C. Hass and H. Ehrenreich, "Band Structure of Semimagnetic Compounds", *Proceedings XVI Int. School on the Physics of Semiconducting Compounds,* 1987, Acta Physica Polonica (to be published).

89. B.E. Larson, K.C. Hass, H. Ehrenreich and A.E. Carlsson, "Theory of Exchange Interactions and Chemical Trends in Diluted Magnetic Semiconductors", Phys. Rev. B (to be published).

90. H. Ehrenreich, K.C. Hass, B.E. Larson and N.F. Johnson, "Electronic Theory of Mn-Alloyed Diluted Magnetic Semiconductors", *Proceedings of the Materials Research Society Symposium on Diluted Magnetic Semiconductors,* (J.K. Furdyna, R.L. Aggarwal and S. von Molner, Eds.), Boston, December 1986, MRS, 1987 (to be published).

91. H. Ehrenreich, K.C. Hass, N.F. Johnson, B.E. Larson and R.J. Lempert, "Electronic Structure and Magnetic Interactions in Diluted Magnetic Semiconductors", *Proceedings of the 18th Int. Conf. on Physics of Semiconductors,* (D. Engstrom, Ed.), 1986, World Scientific Publishers Co. (Singapore, 1987).

92. K.C. Hass and D. Vanderbilt, "Structural Properties of II-VI Crystals and Alloys", *Proceedings of the 18th Int. Conf. on Physics of Semiconductors,*

(D. Engstrom, Ed.), 1986, World Scientific Publishers Co. (Singapore, 1987).

93. D.K. Blanks, R.N. Bicknell, N.C. Giles-Taylor, J.F. Schetzina, A. Petrou and J. Warnock, "Strain Effects in $Cd_{1-x}Mn_xTe-CdTe$ Superlattices", J. Vac. Sci. Technol. B 4, 635 (1986).

94. K.A. Harris, S. Hwang, D.K. Blanks, J.W. Cook, Jr. and J.F. Schetzina, "Growth of CdTe and HgCdTe by Molecular Beam Epitaxy", Sci. Technol. B 4, 581 (1986).

95. D.K. Blanks, R.N. Bicknell, N.C. Giles-Taylor, J.F. Schetzina, A. Petrou and J. Warnock, "Strain Effects in $Cd_{1-x}Mn_xTe-CdTe$ Superlattices", J. Vac. Sci. Technol. A 4, 2120 (1986).

96. R.N. Bicknell, N.C. Giles-Taylor, N.G. Anderson, W.D. Laidig and J.F. Schetzina, "Stimulated Emission from $Cd_{1-x}Mn_xTe-CdTe$ and $Cd_{1-x}Mn_xTe-Cd_{1-y}Mn_yTe$ Multiple Quantum Well Structures", J. Vac. Sci. Technol. A 4, 2126 (1986).

97. E. Isaace, D. Heiman, J.J. Zayhowski, R.N. Bicknell and J.F. Schetzina, "Magnetically Tunable Diluted Magnetic Semiconductor (CdMnTe) Quantum Well Laser", Appl. Phys. Lett. 48, 275 (1986).

98. G.N. Parsons, J.W. Cook, Jr., G. Lucovsky, S.Y. Lin and M.J. Mantini, "Deposition of a-Si,Sn:H Alloy Films by Reactive Magnetron Sputtering from Separate Si and Sn Targets", J. Vac. Sci. Technol. A 4, 470 (1986).

99. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "Growth of High Mobility N-Type CdTe by Photoassisted Molecular Beam Epitaxy", Appl. Phys. Lett. 49, 1737 (1986).

100. K.S. Harris, S. Hwang, Y. Lansari, J.W. Cook, Jr. and J.F. Schetzina, "Growth and Properties of Dilute Magnetic Semiconductor Superlattices Containing $Hg_{1-x}Mn_xTe$", Appl. Phys. Lett. 49, 713 (1986).

101. S. Perkowitz, D. Rajavel, I.K. Sou, J. Reno, J.P. Faurie, C.E. Jones, T. Casselman, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Study of Alloying in the HgTe-CdTe Superlattice", Appl. Phys. Lett. 49, 806 (1986).

102. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "P-Type CdTe Epilayers Grown by Photoassisted Molecular Beam Epitaxy", Appl. Phys. Lett. 49, 1735 (1986).

103. W.S. Enloe, J.C. Parker, J. Vespoli, T.H. Myers, R.L. Harper and J.F. Schetzina, "An Electroreflectance Study of CdTe Films" (to appear in Jour. Appl. Phys.).

104. P. Becla, D. Kaiser, N.C. Giles, Y. Lansari and J.F. Schetzina, "Electrical and Optical Properties of P and As Doped $Cd_{1-x}Mn_xTe$" (submitted to the Jour. Appl. Phys.).

105. Y. Lansari, N.C. Giles, J.F. Schetzina, P. Becla and D. Kaiser, "Optical Properties of Doped $Cd_{1-x}Mn_xTe$" (to be published in the Proceedings of the 1986 MRS Symposium on Diluted Magnetic Semiconductors).

106. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "Controlled Substitutional Doping of CdTe" (to be published in the Proceedings of the 1986 MRS Symposium on Infrared Detectors and Sources).

107. K.A. Harris and J.W. Cook, Jr., "A Mercury Source for Molecular Beam Epitaxy" (submitted for publication in Jour. Vac. Sci. Technol.).

108. P. Becla, D. Kaiser, N.C. Giles, Y. Lansari and J.F. Schetzina, "Electrical and Optical Properties of P and As Doped $Cd_{1-x}Mn_xTe$" (submitted for publication in Journ. Appl. Phys.).

109. K.A. Harris, S. Hwang, D.K. Blanks, J.W. Cook, Jr. and J.F. Schetzina, "Growth of HgCdTe and Other Hg-Based Films and Multilayers by Molecular Beam Epitaxy" *Proceedings of the 1986 Seoul International Symposium on the Physics of Semiconductors and Its Applications,* Seoul National University, Seoul, Korea (1986).

110. K.A. Harris, S. Hwang, Y. Lansari, J.W. Cook, Jr. and J.F. Schetzina, "Properties of Hg-Based Films, Quantum Well Structures and Superlattices Grown by Molecular Beam Epitaxy", *Proceedings of the 1986 International Symposium on the Physics of Semiconductors and Its Applications,* Seoul National University, Seoul, Korea (1986).

111. N.G. Anderson, W.D. Laidig, R.N. Bicknell, N.C. Giles-Taylor and J.F. Schetzina, "Stimulated Emission from $Cd_{1-x}Mn_xTe-Cd_{1-y}Mn_yTe$ Multiple Quantum Well Structures", *Proceedings of the KOSEF/NSF Joint Seminar on the Physics of Semiconductor Materials and Applications,* Korea Advanced Institute of Science and Technology, Seoul, Korea (1986).

112. A. Petrou, J. Warnock, D.K. Blanks, R.N. Bicknell, N.C. Giles-Taylor and J.F. Schetzina, "Strain Effects in $Cd_{1-x}Mn_xTe-CdTe$ Superlattices",

Proceedings of the KOSEF/NSF Joint Seminar on the Physics of Semiconductor Materials and Applications, Korea Advanced Institute of Science and Technology, Seoul, Korea (1986).

113. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "Controlled Substitutional Doping of CdTe Films", 1986 U.S. Workshop on MCT, Dallas (to be published in Jour. Vac. Sci. Technol.).

114. N.C. Giles, R.N. Bicknell and J.F. Schetzina, "Low-Temperature Photoluminescence Study of Doped CdTe Films Grown by MBE", 1986 U.S. Workshop on MCT, Dallas (to be published in Jour. Vac. Sci. Technol.).

115. K.A. Harris, S. Hwang, Y. Lansari, J.W. Cook, Jr. and J.F. Schetzina, "Properties of Hg-Based Films, Quantum Well Structures and Superlattices Grown by MBE", 1986 U.S. Workshop on MCT, Dallas (to be published in Jour. Vac. Sci. Technol.).

116. H. Luo, M. Dobrowolska, Z. Yang, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magnetospectroscopy of HgTe and $Hg_{1-x}Mn_xTe$ Monolayers Grown by MBE", 1986 Workshop on MCT, Dallas (to be published in Jour. Vac. Sci. Technol.).

117. J.F. Schetzina, "Quantum Well Structures and Superlattices Composed of DMS Layers Grown by MBE" (to be published in the Proceedings of the 1986 MRS Symposium on Diluted Magnetic Semiconductors).

118. K.A. Harris, S. Hwang, Y. Lansari, R.P. Burns, J.W. Cook, Jr. and J.F. Schetzina, "Dilute Magnetic Semiconductor Superlattices Containing $Hg_{1-x}Mn_xTe$" (to be published in the Proceedings of the 1986 MRS Symposium on Diluted Magnetic Semiconductors).

119. Z. Yang, M. Dobrowolska, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far Infrared Magneto-Absorption in $Hg_{1-x}Mn_xTe$/HgTe Superlattices" (to be published in the Proceedings of the 1986 MRS Symposium on Diluted Magnetic Semiconductors).

120. N.C. Giles, R.N. Bicknell and J.F. Schetzina, "Low Temperature Photoluminescence Study of Doped CdTe Films Grown by MBE" (to be published in the Proceedings of the 1986 MRS Symposium on Infrared Detectors and Sources).

121. T.H. Myers, J.P. Kairns, K.A. Harris, S. Hwang, D.K. Blanks, J.W. Cook, Jr. and J.F. Schetzina, "Characterization of MCT Epilayers and HgTe-CdTe Superlattice Layers" (to be published in the Proceedings of the 1986 MRS

Symposium on Infrared Detectors and Sources).

122. J.W. Cook, Jr., "MBE Growth of Mercury Cadmium Telluride: Issues and Practical Solutions" (to be published in the Proceedings of the 1986 MRS Symposium on Infrared Detectors and Sources).

123. W. Allred, A.A. Khan, B. Dean, C.J. Johnson, N.C. Giles and J.F. Schetzina, "Growth and Characterization of High Quality, Low Defect, Subgrain Free Cadmium Telluride by a Modified Horizontal Bridgman Technique" (to be published in the Proceedings of the 1986 MRS Symposium on Infrared Detectors and Sources).

124. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "Controlled Substitutional Doping of CdTe Films Grown by MBE", 7th U.S. MBE Workshop, Boston 1986 (to be published in Jour. Vac. Sci. Technol.).

125. K.A. Harris, S. Hwang, Y. Lansari, R.P. Burns, J.W. Cook, Jr. and J.F. Schetzina, "Growth and Properties of Dilute Magnetic Semiconductor Superlattices Containing $Hg_{1-x}Mn_xTe$", 7th U.S. MBE Workshop, Boston 1986 (to be published in Jour. Vac. Sci. Technol.).

126. Y. Shapira, N.F. Oliveira, Jr., D.H. Ridgley, R. Kershaw and A. Wold, "Magnetoresistance and Hall Effect Near the Metal-Insulator Transition of $Cd_{1-x}Mn_xSe$", Phys. Rev. B. 34, 4187 (1986).

127. D. Heiman, P. Becla, R. Kershaw, D. Ridgley, K. Dwight, A. Wold and R.R. Galazka, "Field-Induced Exchange Effects in (Cd,Mn)Te and (Cd,Mn)Se", Phys. Rev. B 34, 3961 (1986).

128. D. Heiman, E.D. Isaacs, P. Becla and S. Foner, "High-Field Magnetization of (Cd,Mn)Te", Phys. Rev. B 35, 3307 (1987).

129. Y. Shapira and N.F. Oliveira, Jr., "High-Field Magnetization Steps and the Nearest-Neighbor Exchange Constant in $Cd_{1-x}Mn_xSe$, $Cd_{1-x}Mn_xTe$ and $Zn_{1-x}Mn_xSe$", Phys. Rev. B 35, 6888 (1987).

130. P.A. Wolff, D. Heiman, E.D. Isaacs, P. Becla, S. Foner, L.R. Ram-Mohan, D.H. Ridgley, K. Dwight and A. Wold, "Recent High Field Work on Diluted Magnetic Semiconductors", *Proceedings of the Int. Conf. on High Magnetic Fields in Semiconductor Physics*, G. Landwehr, Ed., (Springer Series in Solid State Sciences, Vol. 71, 1987) p. 421.

131. Kebede Beshah, David Zamir, Piotr Becla, Peter A. Wolff and Robert G. Griffin, "Te and Cd NMR Study of Local Structure and Bonding in

$Cd_{1-x}Zn_xTe$", Phys. Rev. Rapid Comm. (to be published).

132. D. Zamir, K. Beshah, P. Becla, P.A. Wolff, R.G. Griffin, D. Zax and S. Vega, "NMR Studies of II-VI Semiconductor Alloys", MCT Workshop, 1987 (to be published).

133. S.Y. Yuen, P.A. Wolff, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Optical Nonlinearity in HgTe and HgMnTe", MCT Workshop, 1987 (to be published).

134. P.A. Wolff, S.Y. Yuen, R.R. Galazka and A. Mycielski, "Optical Nonlinearity due to Resonant Impurity Scattering of Electrons in HgCdSe:Fe", MCT Workshop, 1987 (to be published).

135. P. Becla, "Investigation of Electroluminescence and Lasing in Narrow-Gap Manganese Alloyed II-VI Semiconducting Compounds", MCT Workshop, 1987 (to be published).

136. P.A. Wolff and L.R. Ram-Mohan, "What Limits Magnetic Polaron Energies in DMS?" (to appear in the Proceedings of the 1986 Fall Meeting of the MRS).

137. R.L. Aggarwal, "Antiferromagnetic Exchange Constants Between Mn^{2+} Ions in II-VI Semimagnetic Semiconductors" (to appear in the Proceedings of the 1986 Fall Meeting of the MRS).

138. Y. Shapira, "Magnetoresistance and Hall Effect Near the Metal-Insulator Transition of $Cd_{1-x}Mn_xSe$" (to appear in the Proceedings of the 1986 Fall Meeting of the MRS).

139. D. Heiman, E.D. Isaacs, P. Becla and S. Foner, "High Field Magnetization of CdMnTe Alloys" (to appear in the Proceedings of the 1986 Fall Meeting of the MRS).

140. E.D. Isaacs and P.A. Wolff, "Spin Texture in Acceptor-Bound Magnetic Polarons" (to appear in the Proceedings of the 1986 Fall Meeting of the MRS).

141. E.D. Isaacs, D. Heiman, R. Kershaw, D. Ridgley, K. Dwight, A. Wold and J.K. Furydna, "Large Donor-Bound Magnetic Polarons Below T=1K (submitted to Phys. Rev. Lett.).

142. Y. Shapira, E.J. McNiff, Jr., N.F. Oliveira, Jr., E.D. Honig, K. Dwight and A. Wold, "Magnetic Properties of $Cu_2Zn_{1-x}Mn_xGeS_4$: Antiferromagnetic Interactions in the Wurtz-Stannite Structure" (submitted to Phys. Rev. B.)

143. E.D. Isaacs and D. Heiman, "Fiber-Optics for Raman Scattering at Low Temperatures and High Magnetic Fields" (to appear in Rev. Sci. Instr.).

144. S.Y. Yuen, P.A. Wolff, P. Becla and D. Nelson, "Free Carrier Spin-Induced Faraday Rotation in HgCdTe and HgMnTe" *Proceedings of MCT Workshop, 1986* (in press).

145. S.-K. Chang, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Differences in Optical Properties of (111) and (100) CdTe/(Cd,Mn)Te Superlattices", Phys. Rev. B 33, 2589 (1986).

146. Y. Hefetz, W.C. Goltsos, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Exciton Formation and Energy Exchange with d-electron States in ZnSe/(Zn,Mn)Se Multiple Quantum Wells", Appl. Phys. Lett. 48, 372 (1986).

147. X.-C. Zhang, S.-K. Chang, A.V. Nurmikko, L.A. Kolodziejski, R.L. Gunshor and S. Datta, "Quasi-Two Dimensional Exciton-Polaron in CdTe/(Cd,Mn)Te Quantum Wells", Surf. Sci. 170, 665 (1986).

148. X.-C. Zhang, Y.Hefetz, S.-K. Chang, J. Nakahara and A.V. Nurmikko, "Excitons and Their Kinetics in CdTe/(Cd,Mn)Te and ZnSe/(Zn,Mn)Se Quantum Wells", Surf. Sci. 174, 292 (1986).

149. J.-W. Wu, A.V. Nurmikko and J.J. Quinn, "Magnetic Polaron Effects in CdTe/(Cd,Mn)Te Quantum Well Systems", Solid State Comm. 57, 853 (1986).

150. A.V. Nurmikko, Y. Hefetz, S.-K. Chang, L.A. Kolodziejski and R.L. Gunshor, "Influence of Heterointerfaces on Optical Properties of CdTe/(Cd,Mn)Te and ZnSe/(Zn,Mn)Se Superlattices", J. Vac. Sci. and Tech. B 4, 1033 (1986).

151. W.C. Goltsos, A.V. Nurmikko and D.L. Partin, "Optical Bandgap and Magneto-Optical Effects in (Pb,Eu)Te", Solid State Comm. 59, 183 (1986).

152. J.-W. Wu, A.V. Nurmikko and J.J. Quinn, "Excitons in Semimagnetic Semiconductor Quantum Wells - Magnetic Polaron Effects", Phys. Rev. B 34, 1080 (1986).

153. L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, B.P. Gu, Y. Hefetz and A.V. Nurmikko, "Two-Dimensional Metastable Magnetic Semiconductor Structures", Appl. PHys. Lett. 48, 1482 (1986).

154. W. Goltsos, J. Hakahara, A.V. Nurmikko and D.L. Partin, "Electron-Hole Recombination Spectra and Kinetics in PbTe/(Pb,Eu)Te Multiquantum Wells", Surf. Sci. 174, 288 (1986).

155. Y. Hefetz, W.C. Goltsos, D. Lee and A.V. Nurmikko, "Electronic Energy Relaxation and Localization in Two II-VI Compound Semiconductor Quantum Well Structures", in Ultrafast Phenomena V, Springer-Verlag Series in Chemical Physics vol. 46, p. 218.

156. Y. Hefetz, D. Lee, A.V. Nurmikko, S. Sivananthan, X. Chu and J.-P. Faurie, "Quasi-Two Dimensional Excitons in a Strongly Localized Regime in CdTe-ZnTe Superlattices", Phys. Rev. B 34, 4423 (1986).

157. A.V. Nurmikko, D. Lee, Y. Hefetz, L.A. Kolodziejski and R.L. Gunshor, "A Two Dimensional Magnetic Semiconductor Superlattice MnSe/ZnSe", *Proceedings of 18th Int. Conf. Semic. Physics* (Stockholm, 1986) p. 775.

158. W.C. Goltsos, A.V. Nurmikko and D.L. Partin, "Optical Properties of (Pb,Eu)Te Thin Films and Superlattices", *Proceedings of Mat. Res. Soc. Vol. XX* (in press).

159. Y. Hefetz, D. Lee, A.V. Nurmikko, S. Sivananthan, X. Chu and J.P. Faurie, "Two-Dimensional Excitons in a Strongly Localized Regime in CdTe/ZnTe Superlattices", *Proceedings of Mat. Res. Soc. Vol. 77* (in press).

160. D. Lee, A. Mysyrowicz, A.V. Nurmikko and B.F. Fitzpatrick, "Exciton Self Trapping in Zn(Se,Te) Alloys", Phys. Rev. Lett. 58, 1475 (1987).

161. S.-K. Chang, H. Nakata, A.V. Nurmikko, R.L. Gunshor and L.A. Kolodziejski, "Exciton-Optical Phonon Coupling in Resonant Raman Scattering from CdTe/(Cd,Mn)Te Quantum Wells" (submitted to Appl. Phys. Lett. 51, XXX (1987)).

162. J.W. Wu and A.V. Nurmikko, "Stark Shifts on Exciton Luminescence in Quantum Wells: Effect of Coulomb Interaction", Phys. Rev. B 36, XXX (1987).

163. Qiang Fu, A.V. Nurmikko, L.A. Kolodziejski, R.L. Gunshor and J.-W. Wu, "Electric Field Induced Shifts in Exciton Luminescence in ZnSe/(Zn,Mn)Se Superlattices", Appl. Phys. Lett. 51, 578 (1987).

164. G. Bauer, J. Oswald, W. Goltsos and A.V. Nurmikko, "Control of Carrier Lifetime in PbTe Doping Superlattices" (submitted to Appl. Phys. Lett.).

165. J.-W. Wu and A.V. Nurmikko, "Wannier Excitons in Semiconductor Quantum Wells with a Small Valence Band Offset: A Generalized Variational Approach" (submitted to Phys. Rev.).

166. Q. Fu, A. Mysyrowicz, A.V. Nurmikko, R.L. Gunshor and L.A. Kolodziejski, "Excitonic Molecules in ZnSe Quantum Wells" (submitted to Phys. Rev. Lett.).

167. J.-W. Wu and A.V. Nurmikko, "Exciton Tunneling Lifetime Enhancement by Coulomb Interaction in a Quantum Well with a Perpendicular Field" (submitted to Phys. Rev. B).

168. C.S. Lent, M.A. Bowen, J.D. Dow, R.S. Allgaier, O.F. Sankey and E.S. Ho, "Relativistic Empirical Tight-binding Theory of the Energy Bands of GeTe, SnTe, PbTe, PbSe, PbS and Their Alloys", Superlattices and Microstructures 2, 491-499 (1986).

169. C.S. Lent, M.A. Bowen, R.S. Allgaier, J.D. Dow, O.F. Sankey and E.S. Ho, "Impurity Levels in PbTe and $Pb_{1-x}Sn_xTe$, Solid State Commun. 61, 83-7 (1987).

170. R.V. Kasowski, M.-H. Tsai and J.D. Dow, "Dependence on Ionicity of the (110) Surface Relaxations of Zincblende Semiconductors" (submitted).

171. D.W. Jenkins and J.D. Dow, "Electronic Properties of Metastable Ge_xSn_{1-x} Alloys", Phys. Rev. B (in press).

172. S. Lee, J. Sanchez-Dehesa and J.D. Dow, "Theoretical Investigation of the Pressure Dependences of Energy Gaps in Semiconductors", Phys. Rev. B 32, 1152-1155 (1985); 33, 7309 (1986).

173. S. Lee and J.D. Dow, "Electronic Structure of $Pb_{1-x}Sn_xTe$ Semiconductor Alloys", Phys. Rev. B (in press).

174. Z.-W. Fu and J.D. Dow, "Clustering Modes in the Vibrational Spectra of $Hg_{1-x}Cd_xTe$ Alloys", Phys. Rev. B (in press).

175. G. Kim, J.D. Dow and S. Lee, "Theory of Charge-state Splittings of Deep Levels Associated with Sulfur Pairs in Si" (submitted).

176. K.E. Newman, J.D. Dow, B.A. Bunker, L.L. Abels, P.M. Raccah, S. Ugur, D.Z. Xue, S.A. Barnett, J.E. Greene, M.A. Ray, B. Kramer, I. Shah and A. Kobayashi, "Effects of a Zincblende-Diamond Order-Disorder Transition on the Crystal, Electronic and Vibrational Structures of Metastable $(GaAs)_{1-x}(Ge_2)_x$ Alloys", Phys. Rev. B (in press).

177. M.-H. Tsai, J.D. Dow, D.W. Jenkins and R.V. Kasowski, "Pseudo-function Theory of the Electronic Structure of InN", Phys. Rev. B (submitted).

178. R.E. Allen, O.F. Sankey and J.D. Dow, "Theoretical Interpretation of Schottky Barriers and Ohmic Contacts", *Proceedings Int. Conf. Formation of Semiconductor Interfaces*, Marseilles, 1985, ed. G. Le Lay, Surf. Sci. 168, 376-385 (1986).

179. J.D. Dow, "Supercomputers in Solid State Physics", in "Large Scale Computational Device Modeling", ed. K. Hess, (Co-ordinated Science Laboratory, University of Illinois, Urbana, IL, 1986) p. 83-89.

180. M.-H. Tsai, R.V. Kasowski and J.D. Dow, "Relaxation of the non-polar $(10\bar{1}0)$ Surface of Wurtzite AlN and ZnS", Solid State Commun. 64, 231-3 (1987).

181. R.P. Beres, R.E. Allen and J.D. Dow, "Effects of the Band Offset on Interfacial Deep Levels" (submitted).

182. D.W. Jenkins, R.-D. Hong and J.D. Dow, "Band Structure of InN", Superlattices and Microstructures (in press).

183. J.D. Dow, "New Microelectronic Materials", *Proceedings of the 1986 High Technology Conference and Convention,* Indycon-86, Indianapolis, 7-8 Oct. 1986, (Indycon, 8110 Airport Blvd., Los Angeles, CA 90045-3194) pp. 4/4.1-3.

184. R.-D. Hong, D.W. Jenkins, S.Y. Ren and J.D. Dow, "Defects in Superlattices Under Pressure", *Proceedings Materials Research Soc. (1986 Fall)* (in press).

185 A.C. Redfield and J.D. Dow, "Theory of Raman Spectra of Correlated Substitutional Alloys", Solid State Commun. (in press).

186. R. Nicolaides, Y. Liang, W.E. Packard, Z.-W. Fu, H.A. Blackstead, K.K. Chin, J.D. Dow, J.K. Furdyna, W.M. Hu, R.C. Jaklevic, W.J. Kaiser, A.R. Pelton, M.V. Zeller and J. Bellina, "Scanning Tunneling Microscope Tip Structures" (submitted).

187. B.L. Gu, K.E. Newman and P.A. Fedders, "The Role of Correlations in $(GaSb)_{1-x}Ge_{2x}$ Alloys", Phys. Rev. B 35, 9135-9148 (1987).

188. K.E. Newman, B.L. Gu and P.A. Fedders, "Correlations and Ordering in $(GaSb)_{1-x}Ge_{2x}$ Alloys", Interfaces, Superlattices and Thin Films, *Proceedings of the 1986 MRS Fall Meeting,* Vol. 77, eds., J.D. Dow, I.K. Schuller and J. Hilliard (to be published).

189. B.A. Bunker, "EXAFS Studies of Metastable Semiconductors", to be published in Interfaces, Superlattices and Thin Films, Vol. 77 of the Materials Research Society. (1987).

190. B.A. Bunker, "EXAFS Studies of Semiconductors", to be published in J. Vac. Sci. Tech.

191. W.-F. Pong, B.A. Bunker, U. Debska and J.K. Furdyna, "Microstructure of Magnetic Semiconductor Alloys: Bond Lengths in $Zn_{1-x}Mn_xSe$" (submitted for publication).

192. B.A. Bunker, Q.T. Islam, P. Bandyopadhyay and W.-F. Pong, "EXAFS Studies of Semiconductor Microstructure: Defects, Disordered Alloys and Interfaces" (submitted for publication).

193. B.A. Bunker, "Using EXAFS to Study Short-Range Order in Semiconductors", requested for Materials Science Bulletin (in preparation).

INVITED TALKS, COLLOQUIA, SEMINARS AND CONTRIBUTED TALKS

(1986-87)

*1. J.K. Furdyna, "Diluted Magnetic Semiconductors and Their Applications", ARO Workshop on Infrared Materials, Feb. 11-12, 1986, Raleigh, NC.

*2. J.K. Furdyna, "Optical Device Applications of Diluted Magnetic Semiconductors", Int. Conf. of the Society for Optical Engineering (SPIE), April 7-18, 1986, Innsbruck, Austria.

*3. J.K. Furdyna, "Device Applications of Diluted Magnetic Semiconductors", ONR Workshop on Research Opportunities in Magnetism for Naval Applications, June 2-4, 1986, West Lafayette, IN.

*4. J.K. Furdyna, J. Kossut and A.K. Ramdas, "Quantum Wells and Superlattices of Diluted Magnetic Semiconductors", NATO Advanced Research Workshop on Optical Properties of Narrow Gap Low Dimensional Structures, St. Andrews, (U.K.), July 29 - Aug. 1, 1986.

*5. J.K. Furdyna and N. Samarth, "Magnetic Properties of Diluted Magnetic Semiconductors", 31st Annual Conf. on Magnetism and Magnetic Materials, Nov. 17-20, 1986, Baltimore, MD.

6. T.M. Giebultowicz, J.J. Rhyne and J.K. Furdyna, "Mn-Mn Exchange Constants in Zinc-Manganese Chalcogenides", 31st Annual Conference on Magnetism and Magnetic Materials, Baltimore, MD, Nov. 17-20, 1986.

7. T.M. Giebultowicz, J.J. Rhyne, J.K. Furdyna and U. Debska, "Neutron Diffraction Study of Wurtzite-Structured Diluted Magnetic Semiconductor $Zn_{0.45}Mn_{0.55}Se$", 31st Annual Conference on Magnetism and Magnetic Materials, Baltimore, MD, Nov. 17-20, 1986.

8. M. Dobrowolska, Z. Yang, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far Infrared Magnetoabsorption in HgTe-CdTe and $Hg_{1-x}Mn_xTe$-HgTe Superlattices", U.S. Workshop on the Physics and Chemistry of HgCdTe, Dallas, Oct. 1986.

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* Invited

9. H. Luo, M. Dobrowolska, Z. Yang, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far Infrared Magnetospectroscopy of HgTe and $Hg_{1-x}Mn_xTe$ Epilayers Grown by MBE", U.S. Workshop on the Physics and Chemistry of HgCdTe, Dallas, Oct. 1986.

10. Z. Yang, M. Dobrowolska, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far Infrared Magnetoabsorption in $Hg_{1-x}Mn_xTe$/HgTe Superlattices", Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the MRS, Dec. 1-3, 1986, Boston.

11. F.S. Pool, J. Kossut, R. Reifenberger, U. Debska and J.K. Furdyna, "Transport Properties of $Hg_{1-x}Fe_xSe$", Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the MRS, Dec. 1-3, 1986, Boston.

12. B.A. Bunker, W.F. Pong and J.K. Furdyna, "EXAFS Determination of Bond Lengths in $Zn_{1-x}Mn_xSe$", Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the MRS, Dec. 1-3, 1986, Boston.

*13. J.K. Furdyna, "DMS: Some Speculations for the Future", Symposium on Diluted Magnetic (Semimagnetic) Semiconductors of the MRS, Dec. 1-3, 1986, Boston.

14. E.K. Suh, D.U. Bartholomew, J.K. Furdyna, U. Debska, A.K. Ramdas and S. Rodriguez, "Raman Scattering by Magnetic Excitations in $Cd_{1-x}Co_xSe$ and $Cd_{1-x}Fe_xSe$", APS Meeting, New York, March 1987.

15. T.M. Giebultowicz, J.J. Rhyne, W.Y. Ching, D.L. Huber, J.K. Furdyna and W. Minor, "Spin Dynamics in $Zn_{0.3}Mn_{0.7}Te$", APS Meeting, New York, March 1987.

*16. J.K. Furdyna, "Optical Electronic and Magnetic Properties of Diluted Magnetic Semiconductors", Meeting of the Illinois Chapter of the American Vacuum Society, University of Illinois, Urbana-Champaign, April 1987.

*17. J.K. Furdyna, "Challenges and Opportunities in Diluted Magnetic Semiconductor Superlattices and Heterostructures", International Workshop on Superlattice Structures and Devices, University of Minnesota, MN, May 18-20, 1987.

*18. N. Otsuka, "Transmission Electron Microscope Study of Heterostructures", 1986 Workshop on Frontiers in Superlattices and Microstructures, July 1986, LaJolla, CA.

19. B.P. Gu, C. Choi, N. Otsuka, Y. Arakawa, J.S. Smith and A. Yariv, "TEM and Photoluminescence Study on Intermixing of GaAs/GaAlAs Superlattices by Ion Implanation and Annealing", 1986 Electronic Materials Conference, July 1986, Amherst, MA.

20. N. Otsuka, Y.E. Ihm, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "TEM Study of Hg-Based Multilayer Structures", 1986 Workshop on the Physics and Chemistry of MCT, Oct. 1986, Dallas, TX.

21. N. Otsuka, Y.E. Ihm, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "TEM Study of Hg-Based Multilayers Structures", MRS Fall Meeting, Dec. 1986, Boston, MA.

22. R. Venkatasubramanian, N. Otsuka, S. Datta, R.L. Gunshor and L.A. Kolodziejski, "Monte Carlo Simulation of Growth of II-VI Semiconductors by MBE", MRS Fall Meeting, Dec. 1986, Boston, MA.

23. N. Otsuka, R. Venkatasubramanian, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of Growth of II-VI Semiconductors of MBE", SPIE Symposium, March 1987, Panama City, FL.

24. N. Otsuka, "TEM Study of DMS Submicrostructures", II-VI Materials and Device Review, April 1987, Washington, DC.

*25. A.K. Ramdas, "Progress in Shallow Impurities Since 1960: Experimental", Second International Conference on Shallow Impurity Centers, Trieste, Italy, July 28-Aug. 1, 1986.

*26. S. Rodriguez, "Raman Scattering by Diluted Magnetic Semiconductors", 10th Int. Conf. on Raman Spectroscopy, Eugene, OR, Aug. 31-Sept. 5, 1986.

*27. A.K. Ramdas, "Light Scattering Studies of Diluted Magnetic Semiconductors", Symposium of Diluted Magnetic (Semimagnetic) Semiconductors, MRS Fall Meeting, Boston, MA, Dec. 1-5, 1986.

28. B. Das, D.R. Andersen, M. Yamanishi, T.C. Bonsett, R.L. Gunshor, L.A. Kolodziejski and S. Datta, "In-plane Electric-field-induced Quenching of Photoluminescence in (Zn,Mn)Se Superlattices", SPIE Conference on Quantum Well and Superlattice Physics, Bay Point, FL, March 23-24, 1987.

*29. S. Datta, M. Yamanishi, L.A. Kolodziejski and R.L. Gunshor, "Excitons in II-VI Multiquantum Well System", presented at the meeting on 'Excitons in Confined Systems: from Semi-infinite Solids to Quantum Wells', Rome, Italy, April 13-17, 1987.

30. T.C. Bonsett, M. Yamanishi, L.A. Kolodziejski, R.L. Gunshor and S. Datta, "Polarization Dependent Absorption and Gain Spectra of (Cd,Mn)Te and (Zn,Mn)Se Multiple Quantum Well Structures", International Quantum Electronics Conference, Baltimore, MD. April 27-May 1, 1987.

31. A.K. Ramdas, "Piezo- and Photo- Modulation of Optical Properties of Semiconductors: Diluted Magnetic Semiconductors, Single and Multiple Quantum Wells......", Seminar presented at the Scuola Normale Superiore, Pisa, Italy, July 21, 1986.

32. A.K. Ramdas, "Optical Behavior of Diluted Magnetic Semiconductors and Their Superlattices", Physical Chemistry Seminar, Purdue University, Oct. 10, 1986.

33. A.K. Ramdas, "Optical Behavior of Diluted Magnetic Semiconductors", Solid State Seminar at AT&T Bell Laboratories, Murray Hill, NJ, Oct. 27, 1986.

34. A.K. Ramdas, "Diluted Magnetic Semiconductors and Their Superlattices: An Interface of Semiconductor Physics and Magnetism", University of Pennsylvania, Materials Research Series, Nov. 21, 1986.

35. A.K. Ramdas, "Optical Behavior of Diluted Magnetic Semiconductors and Their Superlattices", Physics Colloquium, SUNY-Binghampton, Dec. 8, 1986.

36. S. Rodriguez, "Parity Violation and Electron-spin Resonance of Donors in Semiconductors", Seminar presented at Scuola Normale Superiore, Pisa, Italy, July 17, 1986.

*37. S. Rodriguez, "Parity Violation and Electron-spin Resonance of Donors in Semiconductors", Second Int. Conf. on Shallow Impurity Centers, Trieste, Italy, July 28-Aug.1, 1986.

*38. J.K. Furdyna and S. Rodriguez, "Survey of the Properties of Diluted Magnetic Semiconductors", 'Int. Course on the Physics of Semiconductors and Their Applications to Microelectronics', Bogota, Colombia, Sept. 30, 1986.

*39. S. Rodriguez, "Optical Properties of Diluted Magnetic Semiconductors", 'Int. Course on the Physics of Semiconductors and Their Applications to Microelectronics', Bogota, Colombia, Oct. 2, 1986.

*40. S. Rodriguez, "Parity Violation and Electron-Spin Resonance in Semiconductors", 'Int. Course on the Physics of Semiconductors and Their Applications to Microelectronics', Bogota, Colombia, Oct. 2, 1986.

41. S. Rodriguez, "Raman Scattering in Diluted Magnetic Semiconductors", Seminar presented at Universidad de la Frontera, Temuco, Chile, Oct. 7, 1986.

42. S. Rodriguez, "Raman Scattering in Diluted Magnetic Semiconductors", Seminar presented in the School of Physics, Pontificia Universidad Catolica de Chile, Santiago, Chile, Oct. 10, 1986.

43. Y.R. Lee, A.K. Ramdas and R.L. Aggarwal, "Energy Gap, Excitonic and 'Internal' Mn^{2+} Optical Transitions in Mn-Based II-VI Diluted Magnetic Semiconductors", 18th Int. Conf. on the Physics of Semiconductors, Stockholm, Sweden, Aug. 11-15, 1986.

*44. A.K. Arora, D.U. Bartholomew, D.L. Peterson and A.K. Ramdas, "High Pressure Raman Scattering Study of Phase Transition in $Cd_{1-x}Mn_xTe$", Tenth International Conference on Raman Spectoscopy, Eugene, OR, Aug. 31-Sept. 5, 1986.

45. Y.R. Lee, A.K. Ramdas, F.A. Chambers, J.M. Meese and L.R. Ram Mohan, "Piezomodulated Electronic Spectra of Semiconductor Heterostructures $GaAs/Al_xGa_{1-x}As$ Quantum Well Structures", APS Meeting, New York, March 16-20, 1987.

46. D.U. Bartholomew, E.-K. Suh, S. Rodriguez, A.K. Ramdas and R.L. Aggarwal, "Raman Scattering from Antiferromagnetically Coupled Mn^{2+} Ion Pairs in $Cd_{1-x}Mn_xS$ and $Cd_{1-x}Mn_xSe$", APS Meeting, New York, March 16-20, 1987.

47. A.K. Arora, E.-K. Suh and A.K. Ramdas, "A Raman Scattering Study of High Pressure Phase Transition in $Zn_{1-x}Mn_xSe$", APS Meeting, New York, March 16-20, 1987

48. E. Kartheuser, M. Villeret and S. Rodriguez, "Electronic Generation of Acoustic Waves in Metals", Paper presented by E. Kartheuser at the 7th General Conf. of the Condensed Matter Division of the European Physical Society, Pisa, Italy, April 7-10, 1987.

49. S. Rodriguez, "Vibrational and Magnetic Modes in Semiconductor Superlattices. Theory and Experiments", Seminar presented at Scuola Normale Superiore, Pisa, Italy, May 21, 1987.

50. E. Kartheuser, S. Rodriguez and M. Villeret. "Electronic Generation of Acoustic Waves in Metals", Paper presented by E. Kartheuser at the General Meeting of the Belgian Physical Society, Hasselt, Belgium, June 4, 1987.

*51. L.A. Kolodziejski and R.L. Gunshor, "Multiple Quantum Wells Composed of II-VI Compound Semiconductors", Int. Quantum Electronics Conf., Baltimore, MD, April 27-May 1, 1987.

*52. L.A. Kolodziejski, R.L. Gunshor, A.V. Nurmikko and N. Otsuka, "RHEED Oscillations and the Epitaxial Growth of Quasi-2D Magnetic Semiconductors", NATO Advanced Research Workshop on 'Thin Film Growth Techniques of Low Dimensional Structures', Brighton, England, Sept. 1986.

*53. R.L. Gunshor, L.A. Kolodziejski, N. Otsuka, S. Datta and A.V. Nurmikko, "Submicron Heterostructures of Diluted Magnetic Semiconductors", MRS Symposium, Boston, MA, Dec. 1986.

*54. A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Time-Resolved Spectroscopy and Related Studies in Magnetic Semiconductor Superlattices", MRS Symposium, Boston, MA, Dec. 1986.

*55. A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Optical and Magnetic Characterization of ZnSe/MnSE Superlattices", SPIE Conference on Advances in Semiconductors and Semiconductor Structures, Bay Point, FL, March 1987.

*56. R.L. Gunshor, L.A Kolodziejski and N. Otsuka, "Wide Gap II-VI Superlattices", SPIE Conf. on Adanvces in Semiconductors and Semiconductor Structures, Bay Point, FL, March 1987.

*57. Y. Hefetz, W.C. Goltsos, D. Lee, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Electronic Energy States and Relaxation in $Zn_{1-x}Mn_xSe$ Superlattices", Second Int. Conf. of Superlattices, Microstructures and Microdevices, Göteborg, Sweden, Aug. 17-20, 1986.

58. R.L. Gunshor, L.A. Kolodziejski, N. Otsuka, B.P. Gu, D. Lee, Y. Hefetz and A.V. Nurmikko, "2D Metastable Magnetic Semiconductor Superlattices", Second Int. Conf. on Superlattices, Microstructures and Microdevices, Göteborg, Sweden, Aug. 17-20, 1986.

59. L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, B.P. Gu, Y. Hefetz and A.V. Nurmikko, "Use of RHEED Oscillations for the Growth of 2D Magnetic Semiconductor Superlattices (MnSe/ZnSe)", IV Int. Conf. on Molecular Beam Epitaxy, York, England, Sept. 7-10, 1986.

60. D. Lee, Y. Hefetz, A.V. Nurmikko, L.A. Kolodziejski and R.L Gunshor, "Amomalous Magneto-Optical Effects in a 2-Dimensional Magnetic Semiconductor Superlattice MnSe/ZnSe", MRS Symposium, Boston, MA, Dec. 1986.

61. R. Venkatasubramanian, N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of Growth of II-VI Semiconductors by MBE", MRS Symposium, Boston, MA, Dec. 1986.

62. A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Time-Resolved Spectroscopy and Related Studies in Magnetic Semiconductor Superlattices", MRS Symposium, Boston, MA, Dec. 1986.

63. R.L. Gunshor, L.A. Kolodziejski, N. Otsuka, S. Datta and A.V. Nurmikko, "Submicron Heterostructures of Diluted Magnetic Semiconductors", MRS Symposium, Boston, MA, Dec. 1986.

64. Qiang Fu, A.V. Nurmikko, L.A. Kolodziejski and R.L. Gunshor, "Influence of External Electric Fields on Exciton Recombination in ZnSe/(Zn,Mn)Se Quantum Wells and Superlattices", MRS Symposium, Boston, MA, Dec. 1986.

65. L.A. Kolodziejski, R.L. Gunshor, M.R. Melloch, M. Vaziri, C. Choi and N. Otsuka, "MBE of ZnSe on GaAS Epilayers", SPIE Conf. on Growth of Compound Semiconductors, Panama City, FL, March 1987.

66. N. Otsuka, R. Venkatasubramanian, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Study of the Growth of ZnSe by Molecular Beam Epitaxy", SPIE Conf. on Growth of Compound Semiconductors, Panama City, FL, March 1987.

67. B. Das, D.R. Andersen, M. Yamanishi, T.C. Bonsett, R.L. Gunshor, L.A. Kolodziejski and S. Datta, "In-Plane Electric Field Induced Quenching of Photoluminescence in (Zn,Mn)Se Superlattice", Int. Conf. on Quantum Electronics, Baltimore, MD, April 1987.

68. T.C. Bonsett, M. Yamanishi, L.A. Kolodziejski, R.L. Gunshor and S. Datta, "Polarization Dependent Optical Absorption and Gain Spectra of (Cd,Mn)Te and (Zn,Mn)Se Multiple Quantum Well Structures", Int. Conf. on Quantum Electronics, Baltimore, MD, April 1987.

69. R. Venkatasubramanian, N. Otsuka, S. Datta, L.A. Kolodziejski and R.L. Gunshor, "Monte Carlo Simulation of Growth of II-VI Semiconductors by MBE", MRS Symposium, Boston, MA, Dec. 1986.

70. S. Bandyopadhyay, M.R. Melloch, S. Datta, J.A. Cooper and M.S. Lundstrom, "A Novel Quantum Interface Transistor (QUIT) with Extremely Low Power-delay Product and Very High Transconductance", Int. Electron Devices Meeting, Los Angeles, CA, Dec. 7-10, 1986

71. M. Cahay, M. McLennan, S. Datta and M.S. Lundstrom, "Self-consistent I-V Characteristics of Ultrasmall Device", First Int. Conf. on Numerical Modeling and Simulation, Los Angeles, CA, Dec 11-12, 1986.

72. M. Cahay, M. McLennan and S. Datta, "Analysis of Electron Propagation Through a Two-dimensional Random Array of Scatters", APS Meeting, New York, March 16-20, 1987.

73. S. Bandyopadhyay, B. Das, R. Reifenberger, S. Datta, W.P. Hong and P.K. Bhattacharya, "Aharonov-Bohm Effect in a Double Quantum Well Structure with (InAs) (GaAs) Monolayer Superlattices", APS Meeting, New York, March 16-20, 1987.

74. S. Datta and S. Bandyopadhyay, "Analysis of the Aharonov-Bohm Effect in the Ballistic Regime", APS Meeting, New York, March 16-20, 1987.

*75. S. Datta, "A New Concept for a Quantum Interference Transistor", Workshop on Ballistic Electrons, Santa Barbara, CA, March 22-26, 1987.

*76. S. Datta, "Quantum Transport in Ultrasmall Devices", IBM T.J. Watson Research Center, Yorktown Heights, May 8, 1987.

*77. J. Kossut and J.K. Furdyna, "Effects of Exchange Interactions in DMS Quantum Wells", MRS Symposium of DMS, Boston, MA, Dec. 1-3, 1986.

*78. J.K. Furdyna, "Challenges and Opportunites in Diluted Magnetic Semiconductor Superlattices and Heterostructures", Int. Workshop on Superlattice Structures and Devices, University of Minnesota, MN, May 18-20, 1987.

*79. J. Kossut and J.K. Furdyna, "Issues and Opportunities in DMS Quantum Wells and Superlattices", XVI School on Physics of Semiconducting Compounds, Jaszowiec, Poland, April 1987.

80. H. Ehrenreich *et al.*, "Electronic Theory of Mn-Alloyed Diluted Magnetic Semiconductors", MRS Symposium, Boston, MA, Dec. 1986.

81. H. Ehrenreich *et al.*, "Electronic Structure and Magnetic Interactions in Diluted Magnetic Semiconductors", 18th Int. Conf. on the Physics of Semiconductors, Stockholm, Sweden, Aug. 11-15, 1986.

82. H. Ehrenreich *et al.*, "Structural Properties of II-VI Crystals and Alloys", 18th Int. Conf. on the Physics of Semiconductors, Stockholm, Sweden, Aug. 11-15, 1986.

83. H. Ehrenreich *et al.*, "Bond Relaxation in $Hg_{1-x}Cd_xTe$ and Related Alloys", Workshop on the Physics and Chemistry of Mercury Cadmium Telluride,

Dallas, TX, Oct. 7-9, 1986.

84. H. Ehrenreich *et al.*, "Theory of the Electronic Structure and Magnetic Interactions in Mn-Based Diluted Magnetic Semiconductors", APS Meeting, New York, March 16-20, 1987.

85. H. Ehrenreich *et al.*, "Band Structure of Semimagnetic Compounds", XVI Int. School on the Physics of Semiconducting Compounds, Jaszowiec, Poland, April 6-12, 1987.

86. H. Ehrenreich *et al.*, "Electronic and Magnetic Properties of II-VI Diluted Magnetic Semiconductors", 3rd Int. Conf. on II-VI Compounds, Monterey, CA, July 12-17, 1987.

87. H. Ehrenreich *et al.*, "Effective Masses and Optical Matrix Elements in Semiconductor Superlattices", 3rd Int. Conf. on Superlattices, Microstructures and Microdevices, Chicago, IL, Aug. 17-20, 1987.

*88. J.F. Schetzina, "Properties of $Cd_{1-x}Mn_xTe$−CdTe Superlattices", Symposium on Dilute Magnetic Semiconductors, MRS Boston, MA, 1986.

*89. J.F. Schetzina, "Quantum Well Structures and Superlattices Composed of II-VI Materials Containing Magnetic Ions", KOSEF/NSF Joint Seminar on the Physics of Semiconductor Materials and Applications, Seoul, Korea (1986).

*90. J.F. Schetzina, "MBE Growth of II-VI Semiconductor Films and Superlattices", 1986 Seoul Int. Symposium on the Physics of Semiconductors and Its Applications, Seoul, Korea (1986).

*91. J.F. Schetzina, "Growth and Properties of CdTe on Sapphire and GaAs Substrates", ARO Infrared Materials Symposium, Raleigh, NC (1986).

*92. J.F. Schetzina, "Synthesis and Properties of Novel Semiconductor Multilayer Structures", ARO Infrared Materials Symposium, Raleigh, NC (1986).

*93. J.F. Schetzina, "Quantum Well Structures and Superlattices Composed of II-VI Semiconductors", MRS Symposium on Compound Semiconductors, Palo Alto, CA (1986).

*94. J.F. Schetzina, "MBE Growth of II-VI Semiconductor Films and Superlattices", DARPA Focal Plane Array Symposium, Washington, DC (1986).

*95. J.F. Schetzina, "Recent Advanced In MBE Growth of II-VI Semiconductors", DARPA/MRC Symposium on Compound Semiconductors, La Jolla, CA (1986).

96. N.C. Giles-Taylor, K.A. Harris, R.W. Yanka, J.W. Cook, Jr. and J.F. Schetzina, "Photoluminescence Study of CdTe Films Grown by Molecular Beam Epitaxy", 1986 MRS Spring Meeting, Palo Alto, CA (April 15-19, 1986).

97. A. Barrientos, C. Almasan, T. Datta, E.R. Jones, Jr., R.N. Bicknell and J.F. Schetzina, "Low Temperature dc Susceptibility of $Cd_{1-x}Mn_xTe$ Bulk, Thin Films and Thin Film Superlattices", BAPS 31, 252 (1986).

98. E.D. Isaacs, D. Heiman, J.J. Zayhowski, R.N. Bicknell and J.F. Schetzina, "Magnetically-Tunable (Cd,Mn)Te Quantum Well Laser", BAPS 31, 604 (1986).

99. K.A. Harris, S. Hwang, N. Otsuka, J.W. Cook, Jr. and J.F. Schetzina, "Structural Characterization of CdTe and HgTe Films and HgTe-CdTe Superlattices Grown by Molecular Beam Epitaxy", BAPS 31, 652 (1986).

100. S. Hwang, K.A. Harris, Y. Lansari, D.K. Blanks, J.W. Cook, Jr. and J.F. Schetzina, "Optical and Electrical Properties of $Hg_{1-x}Cd_xTe$ Films and HgTe-CdTe Superlattices Grown by Molecular Beam Eptiaxy", BAPS 31, 655 (1986).

101. N.C. Giles, R.N. Bicknell and J.F. Schetzina, "Low-Temperature Photoluminescence Study of Doped CdTe Films Grown by MBE", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

102. R.N. Bicknell, N.C. Giles, J.F. Schetzina and C. Hitzman, "Controlled Substitutional Doping of CdTe Films", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

103. K.A. Harris, S. Hwang, Y. Lansari, J.W. Cook, Jr. and J.F. Schetzina, "Properties of Hg-Based Films, Quantum Well Structures and Superlattices Grown by MBE", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

104. M. Dobrowolska, Z. Yang, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magneto-Absorption in HgTe/CdTe and $Hg_{1-x}Mn_xTe$/HgTe Superlattices", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

105. N. Otsuka, K.A. Harris, J.W. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Transmission Electron Microscope Study of Hg-Based Multilayer Structures", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

106. H. Luo, M. Dobrowolska, Z. Yang, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far-Infrared Magnetospectroscopy of HgTe and

$Hg_{1-x}Mn_xTe$ Monolayers Grown by MBE", 1986 U.S. Workshop on MCT, Dallas, TX (1986).

107. Y. Lansari, N.C. Giles, J.F. Schetzina and P. Becla, "Optical Properties of Doped $Cd_{1-x}Mn_xTe$", 1986 MRS Fall Meeting, Boston, MA (1986).

108. R.N. Bicknell, N.C. Giles and J.F. Schetzina, "Controlled Substitutional Doping of CdTe Films", 1986 MRS Fall Meeting, Boston, MA (1986).

109. N.C. Giles, R.N. Bicknell and J.F. Schetzina, "Low Temperature Photoluminescence Study of Doped CdTe Films Grown by MBE", 1986 MRS Fall Meeting, Boston, MA (1986).

110. T. Datta, A. Barrientos, E.R. Jones, Jr., J. Aminzadeh and J.F. Schetzina, "Universality of the Spin-Glass Transition in the $Cd_{1-x}Mn_xTe$ System", 1986 MRS Fall Meeting, Boston, MA (1986).

111. Z. Yang, M. Dobrowolska, H. Luo, J.K. Furdyna, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Far Infrared Magneto-Absorption in $Hg_{1-x}Mn_xTe$/HgTe Superlattices", 1986 MRS Fall Meeting, Boston, MA (1986).

112. K.A. Harris, S. Hwang, Y. Lansari, R.P. Burns, J.W. Cook, Jr. and J.F. Schetzina, "Dilute Magnetic Semiconductor Superlattices Containing $Hg_{1-x}Mn_xTe$", 1986 MRS Fall Meeting, Boston, MA (1986).

113. W. Allred, A.A. Khan, B. Dean, C.J. Johnson, N.C. Giles and J.F. Schetzina, "Growth and Characterization of High Quality, Low Defect, Subgrain Free Cadmium Telluride by a Modified Horizontal Bridgman Technique", 1986 MRS Fall Meeting, Boston, MA (1986).

114. N. Otsuka, K.A. Harris, J.W. Cook, Jr. and J.F. Schetzina, "Transmission Electron Microscope Study of Hg-Based Multilayer Structures", 1986 MRS Fall Meeting, Boston, MA (1986).

115. T.H. Myers, J.P. Kairns, K.A. Harris, S. Hwang, D.K. Blanks, J.W. Cook, Jr. and J.F. Schetzina, "Characterization of MCT Epilayers and HgTe-CdTe Superlattice Layers", 1986 MRS Fall Meeting, Boston, MA (1986).

116. R.P. Burns, J.K. Gobble, D.K. Blanks and J.F. Schetzina, "Double Crystal X-ray Diffraction Study of II-VI Semiconductor Films and Superlattices Grown by MBE", BAPS 31, 1967 (1986).

117. R.L. Harper, Jr., Y. Lansari, W.S. Enloe and J.F. Schetzina, "Photoreflectance Study of II-VI Semiconductor Films and Superlattices",

BAPS 31, 1768 (1986).

118. D.W. Tilley, "A Computer Network for a Solid State Physics Laboratory", BAPS 31, 1768 (1986).

*119.J.F. Schetzina, "Dilute Magnetic Semiconductor Quantum Wells", Seminar at Purdue University, Physics Department, West Lafayette, IN (1986).

*120.J.F. Schetzina, "Properties of II-VI Quantum Well Structures Grown by MBE", Seminar at University of Notre Dame, Physics Department, South Bend, IN (1986).

*121.J.F. Schetzina, "Quantum Well Structures Containing Magnetic Ions", Seminar at Martin Marietta Laboratories, Baltimore, MD (1986).

*122.J.F. Schetzina, "Submicron Heterostructures of DMS Materials", Seminar at Purdue University (1986).

*123.J.F. Schetzina, "Novel Structures Composed of II-VI Semiconductors", Seminar at Naval Research Laboratory, Washington, DC (1986).

*124.J.F. Schetzina, "MBE Growth of II-VI Films, Qauntum Well Structures and Superlattices", Seminar at Texas Instruments Central Laboratory, Dallas, TX (1986).

*125.A.V. Nurmikko, presentation at Bell Communications Research and Bell Labs, January 1986.

*126.A.V. Nurmikko, presentation at International School of Semiconductor Physics, Jasowicz, Poland, April 1986.

*127.A.V. Nurmikko, presentation at Workshop on High Speed Optical Nonlinear Processes, Tucson, May 1986.

*128.A.V. Nurmikko, presentation at International Quantum Electronics Conference, San Francisco, June 1986.

*129.A.V. Nurmikko, presentation at Technical University of Helsinki, Finland, July 1986.

*130.A.V. Nurmikko, presentation at University of Tampere, Finland, August 1986.

*131.A.V. Nurmikko, presentation at Symposium on Artificial Microstructures, Los Alamos, August 1986.

*132.A.V. Nurmikko, presentation at Annual Meeting of Electrochemical Society, San Diego, October 1986.

*133.A.V. Nurmikko, presentation at Materials Research Society Meeting, Boston, December 1986.

*134.A.V. Nurmikko, presentation at the American Physical Society, New York, March 1987.

*135.A.V. Nurmikko, presentation at the Society of Photoinstrumentation Engineering, Florida, March 1987.

*136.A.V. Nurmikko, presentation at the American Physical Society, New York Section, April 1987.

*137.A.V. Nurmikko, presentation at International Quantum Electronics Conference, Baltimore, April 1987.

*138.A.V. Nurmikko, presentation at National Research Council, Ottawa, Canada, May 1987.

*139.A.V. Nurmikko, presentation at U.S.-Japan Seminar on Quantum Electronics, Monterey, July 1987.

*140.A.V. Nurmikko, presentation at Electronic Properties of Two Dimensional Systems, Santa Fe, July 1987.

141. A.V. Nurmikko, presentation at Physics of Compound Semiconductor Interfaces, Pasadena, January 1986.

142. A.V. Nurmikko, presentation at American Physical Society Meeting (6 papers), Las Vegas, March 1986.

143. A.V. Nurmikko, presentation at International Quantum Electronics Conference, San Francisco, June 1986.

144. A.V. Nurmikko, presentation at Conference on Ultrafast Phenomena, Snowmass, CO, June 1986.

145. A.V. Nurmikko, presentation at Int. Conference on Semiconductor Physics, Stockholm, August 1986.

146. A.V. Nurmikko, presentation at Int. Conference on Semiconductor Superlattices and Microstructures, Gothenburg, August 1986.

147. A.V. Nurmikko, presentation at 4th Int. Conf. on Molecular Beam Epitaxy, York, England, September 1986.

148. A.V. Nurmikko, presentation at Materials Research Society Meeting, Boston, December 1986.

149. A.V. Nurmikko, presentation at American Physical Society, New York, March 1987 (5 papers).

150. A.V. Nurmikko, presentation at Modulated Semiconductor Structures, Montpellier, France, July 1987 (3 papers).

151. A.V. Nurmikko, presentation at Superlattices and Microstructures, Chicago, Aug. 1987 (5 papers).

*152.J. Dow, "Shallow-deep Transitions for Impurities in Quantum Wells and in Superlattices", Second Int. Conf. on Superlattices, Microstructures and Microdevices, Chalmers University of Technology, Goteborg, Sweden, Aug. 17-20, 1986.

*153.J. Dow, "Impurity Levels in IV-VI Semiconductors", Illinois Chapter of the American Vacuum Society Meeting, Rolling Meadows, Il, Sept. 26, 1986.

*154.J. Dow, "New Microelectronic Materials", in the session entitled "The Cutting Edge in Microelectronics" at the 1986 High Technology Conference and Convention, Indycon-86, Indianapolis, IN, Oct. 8, 1986.

*155.J. Dow, "Doping Anomalies in IV-VI Semiconductors", 14th Midwest Solid State Theory Symposium, Amoco Research Center, Naperville, IL, Oct. 27. 1986.

*156.J. Dow, "Antisite Defects and Schottky Barriers", Interface Chemistry Workshop, Stanford University, Stanford, CA, Nov. 4, 1986.

157. J. Dow, "Dependence on Ionicity of the (110) Surface Relaxation of Zincblende Semiconductors", 14th Annual Conference on Physics and Chemistry of Semiconductor Interfaces, Salt Lake City, UT, Jan. 27-29, 1987.

158. J. Dow, "Doping Anomalies in Semiconductors", 1987 Sanibel Symposia, Quantum Theory Project, Marineland, FL, March 16-21, 1987.

159. J. Dow, "Supercomputing and Artificial Materials", University of Minnesota Supercomputer Institute, Minneapolis, MN, May 15, 1987.

*160.K.E. Newman, "Ordering Transitions in Semiconductors", presented at the MRS Meeting, December 6, 1986, Boston, MA.

161. K.E. Newman, "Ordering Transitions in Semiconductors", Western Michigan University, Oct. 14, 1986.

162. K.E. Newman, "Ordering Transitions in Semiconductors", University of Pittsburgh, March 5, 1987.

163. K.E. Newman, "Order-Disorder Transitions in Semiconductors", Tsinghua University, Beijing, PRC, May 14, 1987.

164. K.E. Newman, "Deep Traps in Silicon-Germanium Alloys", and "Renormalization Group Theory and Critical Phenomena", series of 4 lectures, Tsinghua University, Beijing, PRC, May 15 - May 21, 1987.

165. K.E. Newman, "Order-Disorder Transitions in Semiconductors", University of Science and Technology of China, Hefei, Anhui Province, PRC, May 26, 1987.

*166 B.A. Bunker, "EXAFS Studies of Ternary and Multinary Semiconductor Alloys", The 1986 Workshop on Mercury Cadmium Telluride, Dallas, TX, Oct. 7-9, 1986.

*167. B.A. Bunker, "X-Ray Absorption Studies of Metal-Semiconductor Interfaces", Workshop on III-V Metal: Semiconductor Interfacial Chemistry and Its Effects on Electical Properties, Stanford, CA, Nov. 3-5, 1986.

*168. B.A. Bunker, "EXAFS Studies of Metastable Semiconductors", MRS Meeting, Boston, MA, Dec. 2-6, 1986.

*169. B.A. Bunker, "EXAFS Studies of Semiconductor Alloys", NATO Advanced Study Institute on Alloy Phase Stability, Maleme, Crete, Greece, June 23, 1987.

*170. B.A. Bunker, "EXAFS Studies of Semiconductor Microstructure", Third Int. Superlattice Conf., Chicago, IL, Aug. 17-20, 1987.

171. B.A. Bunker, "EXAFS Studies of Semiconductor Systems: Recent Results", Condensed-Matter Seminar, University of Illinois, Oct. 31, 1986.

172. B.A. Bunker, "Semiconductor Structure as Probed with EXAFS and XANES", Solid State Seminar, Kodak Research Laboratories, Rochester, NY, April 20, 1987.

173. B.A. Bunker, "X-Ray Absorption and Electron Energy-Loss Spectroscopy", series of 5 lectures at Tsinghua University, Beijing, China, May 13-20, 1987.

174. B.A. Bunker, "EXAFS Studies of Semiconductors", Solid State Seminar, Tsinghua University, Beijing, China, May 21, 1987.

175. B.A. Bunker, "X-Ray Absorption Studies of Semiconductors", Solid State Seminar, Institute of Physics, Chinese Academy of Sciences, Beijing, China, May 22, 1987.

176. B.A. Bunker, "Recent Applications of X-Ray Spectroscopy", Solid State Seminar, University of Science and Technology of China, Hefei, China, May 26, 1987.

177. B.A. Bunker, "EXAFS Studies of Semiconductor Microstructures", Colloquium at the University of Notre Dame, Notre Dame, IN, Sept. 2, 1987.

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