PHYSICAL PROPERTIES OF CdTe FILMS GROWN BY HOTWALL AND MOLECULAR BEAM TECHNIQUES(U) NORTH CAROLINA STATE UNIV RALEIGH J F SCHETZINA JUN 84 ARO-17772.11-EL UNCLASSIFIED DAA029-81-K-0055
Results have shown that MBE and hotwall MBE techniques can be employed to grow high quality epitaxial CdTe films, suitable for use as substrates for Hg CdTe film growth, using alternative substrates. In particular,
CdTe (0001) sapphire and CdTe (100) GaAs provide viable alternatives to bulk CdTe for use as substrates in the 2-5 μm and 8-14 μm IR regions, respectively.

The most recent results indicate that layers grown by hotwall MBE are at least comparable to and, perhaps, superior to MBE grown films. This is an important finding because it implies that the CdTe epitaxial film growth process on these alternatives substrates may be "scaled-up" to meet production needs for substrate using batch processing techniques.
SUMMARY OF ACCOMPLISHMENTS AT NCSU UNDER
ARO SUPPORT OF INFRARED MATERIALS RESEARCH AT NCSU
March 1, 1984 - February 29, 1984

Publications and presentations which describe the work completed under
ARO contract DAAG29-81-K-0055 are listed below:

PUBLICATIONS


PAPERS PRESENTED AT PROFESSIONAL MEETINGS


INVITED PAPERS AND COLLOQUIA


STUDENTS SUPPORTED AT NCSU UNDER ARO CONTRACT DAAG29-81-K-0055

Yawcheng Lo, MS in Physics, 1982.
T.H. Myers, PhD in Physics, 1983.
N.C. Giles, PhD in Physics expected in June, 1986.
D.K. Blanks, Post-Doctoral Research Associate.
PRINCIPAL RESULTS OF RESEARCH

The interested reader is referred to the above publications for a full description of the results obtained at NCSU under ARO contract DAAG29-81-K-0055. In addition, the principal investigator (J.F. Schetzina) may be reached at (919) 737-2515 if further details of the completed work are desired.

Briefly, at NCSU we have shown that MBE and hotwall MBE techniques can be employed to grow high quality epitaxial CdTe films, suitable for use as substrates for Hg CdTe film growth, using alternative substrates. In particular, CdTe / (0001) sapphire and CdTe / (100) GaAs provide viable alternatives to bulk CdTe for use as substrates in the 2-5 \( \mu \)m and 8-14 \( \mu \)m IR regions, respectively. The above layers, grown at NCSU by MBE and hotwall MBE, show sharp x-ray diffraction patterns, low line dislocation densities (less than or equal to \( 10^4/cm^2 \) for CdTe/ (100) GaAs), large photoconductivity and an exhibit a very bright photoluminescence dominated by a narrow (\( \sim 11 \) meV) near-edge peak of excitonic origin. Many of the CdTe layers on both sapphire and GaAs exhibit edge luminescence at room temperature, which is further evidence of their high quality.

Our most recent results indicate that layers grown by hotwall MBE are at least comparable to and, perhaps, superior to MBE grown films. This is an important finding because it implies that the CdTe epitaxial film growth process on these alternatives substrates may be "scaled-up" to meet production needs for substrate using batch processing techniques.

Work at NCSU dealing with CdTe film growth on sapphire and GaAs along with detailed structural, optical, and electrical characterization studies, is continuing at the present time under ARO contract DAAG29-84-K-0039.