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W.J. Collis

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Departement of Electrical Engineering
Greensboro, NC 27411

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The purpose of this grant was the acquisition of an X-ray diffractometer system for use in evaluating the heteroepitaxial growth of III-V semiconductor compounds and alloys. The diffraction data permit a determination of the lattice constant mismatch between the single crystal substrate and the epilayer.

Keywords: Semiconductors, X-Ray Diffraction, Epitaxial growth. (CP)

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AN X-RAY DIFFRACTION SYSTEM FOR EVALUATING THE EPITAXIAL GROWTH OF III-V ALLOY SEMICONDUCTORS

Final

~~ANNUAL~~ TECHNICAL REPORT

W. J. Collis

September 30, 1984

for

Air For Office of Scientific Research

Grant Number: AFOSR 83-0232

from

North Carolina Agricultural and Technical
State University
Department of Electrical Engineering
Greensboro, NC 27411

AN X-RAY DIFFRACTION SYSTEM FOR EVALUATING THE EPITAXIAL GROWTH OF III-V ALLOY SEMICONDUCTORS

Purpose

The purpose of this grant was the acquisition of an X-ray diffractometer system for use in evaluating the heteroepitaxial growth of III-V semiconducting compounds and alloys. The diffraction data permit a determination of the lattice constant mismatch between the single crystal substrate and the epilayer.

Equipment Purchase

After completing the price quotation and bidding procedures, the purchase order for the X-ray system was issued by the University on July 18, 1984 (Purchase Order No. 145869).

Vendor:	Philips Electronic Instruments, Inc. 85 McKee Drive Mahwah, NJ 07430 (201) 529-3800
Components of System:	PW 1729 2500 Watt X-Ray Generator APD 3520 Data Acquisition System Goniometer + Monochromator + Scintillator Detector Copper Target X-Ray Tube Laue Back Reflection Camera for Dry Film Water Chiller, 3500 Watts
Total Cost:	$77,554 (including 4.5% sales tax)

Because of the cost/budget limitations, the tungsten target X-ray tube for use with the Laue camera could not be purchased. This tube shall be acquired with possible future funding (ca. $2800).

The bid specifications indicated a 120-day delivery. Philips Electronics has acknowledged entering the order on July 31, 1984.

The following are active research contracts/grants which could utilize the capabilities of the X-ray diffraction system. It is assumed that once the X-ray diffraction system is operational, various materials research projects in the Department of Mechanical Engineering may also benefit from its presence.

"Material Growth and Characterization for Solid State Devices"
Dr. E. K. Stefanakos, EE
NASA, Grant No. NSG 1390
December 1, 1983--November 30, 1984 (first year of a three-year grant)

"Heteroepitaxial Growth of III-V Semiconductor Compounds by Metal Organic Chemical Vapor Deposition for Device Applications"
Dr. W. J. Collis, EE
NASA Grant No. NAG-1-403
October 1, 1984--September 30, 1985 (second year of a three-year grant)

"Current Controlled LPE Growth of InGaAsP"
Dr. E. K. Stefanakos, EE
U. S. Army Research Office, Grant No. DAAG-29-84-G-0003
July 1, 1984--June 30, 1985 (first year of a three-year grant)