II. ELECTRON MATERIALS ANALYSIS BY AUGER ELECTRON MICROSCOPE (AEM)

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1. ULTRAHIGH-SENSITIVITY ELECTRON OPTICAL DETERMINATION AND LOCATION OF IMPURITY SPECIES IN Si AND IN GaAs AND OTHER BINARY, TERNARY, AND QUARTERNARY COMPOUND SEMICONDUCTORS

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Our research objective is the elucidation of depth profiles in Si and GaAs, and in other binary compound semiconductors (and eventually ternary and quarternary compound semiconductors). We are especially interested in the sharpness of boundaries that isolate low-refractive-index components from high-refractive-index components in integrated optic devices, and that separate regions of different doping in integrated electronic circuit structures. We will also be probing profiles at semiconductor-encapsulant interfaces after controlled annealing of the semiconductor, which will help establish relationships between defects produced during annealing and outdiffusion during annealing of semiconductor atoms into the matrix of the encapsulating material. Such studies will clarify further the complex nature of these compounds, and help specify annealing-produced defects in crystal structure in terms of their effects on the optical and electrical properties of the semiconductor material.

We are now trying to obtain our first images with calibrated test specimens, and our research progress is following the schedule proposed to the Joint Services in September 1976.