

TRW SPACE TECHNOLOGY LABORATORIES

THOMPSON RAMO WOOLDRIDGE INC.

ONE SPACE PARK • REDONDO BEACH, CALIFORNIA

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Attention: Mr. M. Schach
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Subject : Monthly Progress Report
Period Ending 1 August 1965
Contract NAS5-3805
Report No. 4161-6014-KU-000

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I. Progress in This Report Period

On 16 July 1965 a meeting was held between representatives of Goddard Space Flight Center and TRW Systems to discuss the results of efforts obtained to date and further efforts on this program. As a result of this meeting, it was agreed that minority carrier lifetime measurements in silicon were of vital importance in the determination of recombination characteristics in silicon. In addition to carrier lifetime data, it was agreed that considerable effort should be expended on the annealing characteristics of radiation induced defect levels, and the effect of different dopant materials on radiation induced defect levels. It is felt that as the efforts described above proceed, meaningful experiments on the irradiation temperature dependence of these effects will become evident. It is, therefore, anticipated at this time that later in the program electron experiments in the 1 to 10 Mev range will be conducted as a function of radiation temperature. Several crystals with non standard doping have been grown and the material is now available to start studies of the effects of dopant on defect introduction rate.

Annealing studies were made on the $E_v + 0.3$ ev and on the $E_c - 0.17$ ev levels. The repeated efforts show that the $E_v + 0.3$ ev does not anneal to any extent at 400°C or lower. It was hoped that the annealing characteristic could be correlated with that of n on p type solar cells. Although these early attempts were unfavorable, other variables have not been investigated. Material used in these studies was high resistivity, low dislocation, crucible grown. Further work is planned to investigate the effects of resistivity and dislocations. Benski and Augustynak indicated that radiation defects anneal much more rapidly in high dislocation density silicon.

Isochronal anneals of the E_c - 0.17 ev level indicate that this is in good agreement with ESR studies of the A center and infra red studies of the 12 micron absorption in electron irradiated silicon.

The information obtained in the course of this work on radiation induced energy levels in silicon will be presented at the Photovoltaic Specialist Conference to be held in October at NASA Goddard Space Flight Center.

II. Anticipated Activities During the Next Report Period

With the arrival of silicon material of various dopants, 1.0 Mev electron irradiation will be initiated to determine energy level and annealing characteristics. In addition, efforts will continue on our equipment for lifetime measurements.

III. Manpower Expended in This Report Period

MANPOWER EXPENDITURES NAS5-3805

Period 27 June - 1 August

	<u>Total</u>
H. Y. Tada	24
J. R. Carter	136
R. G. Downing	14
F. T. Sniveley	120
W. K. Van Atta	<u>148</u>
Total	442

Respectfully submitted,

R. G. Downing
R. G. Downing
Project Manager

Approved:

J. M. Denney
J. M. Denney, Director
Solid State Physics Laboratory

RGD/smb