CONFERENCE ON SOLAR ENERGY: THE SCIENTIFIC BASIS.

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MONDAY AND TUESDAY.

THE PHOTOVOLTAIC EFFECT IN CdS CRYSTALS

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SECTION   C   Business Administration   ROOM 110

DAY   Tuesday   HOUR   8:30

CdS crystals with suitable electrodes have been found to have pronounced photovoltaic effects. The crystals investigated were synthetic crystals grown from the vapor phase. The absorption cutoff for these crystals is approximately 5200 Å. At longer wavelengths the absorption coefficient drops sharply resulting in considerable transparency in the visible and near infrared. Photovoltaic cells produced from these crystals have two peaks in the spectral response. One peak comes at the absorption cutoff and the other peak occurs at longer wavelengths. The response at longer wavelengths (longer than 5200 Å) is interesting in that it occurs in a region of limited absorption and also the energy is not sufficient to excite an electron from the valence band to the conduction band. The voltage current characteristics for the cell can be reasonably well explained by an equivalent circuit which uses a non-linear shunt resistance across a current generator. A small amount of series resistance intrinsic to the crystal seems to be necessary to bring the curves into agreement with experiment. The voltage is measured across a known load resistance and the current computed. The results show, particularly for low light levels, that the internal D.C. impedance can be accurately measured, but that not all of the circuit parameters can be determined exactly. The cells have a quantum yield of unity and convert solar energy to electrical energy with efficiencies of five percent.

I. Introduction

The photovoltaic effect in CdS crystals shows an anomaly in the spectral response. The mechanism involved in the conduction processes in CdS may help