The electronic properties of low-cost, thin-film solar cells are complicated by the non-ideal nature of the semiconductor layers. Typically, the fundamental electronic properties of such materials are evaluated using current-voltage and capacitance-voltage measurements. However, in these devices, it is common for the back contact to be non-ohmic. We are exploring the impact of such a back contact on the outcome of standard capacitance-based characterization techniques. We compare computer models of capacitance response with measurements of simple model electronic circuits, and of solar cell devices.

**Differential Capacitance**: \[ C = \frac{\partial Q}{\partial V} = \epsilon \frac{A}{W} \] (1)

**Capacitance-Voltage measurements**: Ideal C-V data provides:
- Doping Densities.
- Depletion Width.
- \( V_B \) of cell.

Forward Bias: \( V_n^+ - n^- \)

Neutral: \( V_n^+ - 0 \) V

Reverse Bias: \( V_n^- + n^+ \)

After seeing the theoretical capacitance with an ohmic contact, it is interesting to analyze the effect a bad back contact has upon solar cells. A bad back contact resists the flow of current from the cell.

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**References**