Introduction

By E. H. Brooks

The Joint ANS-ASTM Conference: Radiation Effects in Electronics was organized to accomplish two objectives. The primary objective was to assemble those people concerned with radiation effects in electronics and present only state-of-the-art material. The secondary objective was to foster communication and cooperation among the various societies concerned with radiation effects. The primary objective was considered to be successfully accomplished as evidenced by the quality and timeliness of the papers presented. The success of the second objective cannot be measured as easily but it is believed that significant progress was made.

The papers presented at the meeting may be grouped into three categories: 1) radiation effects on materials, components and systems, 2) radiation damage correlation, and 3) experimental techniques and facilities. Papers of the first two types are presented herein and all papers of the third type were categorically rejected for publication because the material was considered to be of current interest only.

Investigations of ionizing radiation effects on transistors revealed that previously unexplained anomalies in the reciprocal gain vs. exposure at low operating currents and low exposures can definitely be attributed to ionization-induced permanent changes in the surface recombination velocity. In addition, surface radiation effects on semiconductor devices apparently are predictable under specific operating conditions. Permanent radiation damage mechanisms in semiconductor devices are sufficiently understood and predictable to permit the designer to harden solid-state circuits to a moderate degree. Ample experimental data is presented which indicates that circuits may be hardened to withstand in excess of 10^{14} nvt with acceptable degradation in response.

Some excellent experimental data on neutron-gamma-charged particle damage correlation is presented but agreement with analytical results are poor because of the different damage mechanisms. Agreement between experimental and analytical determinations of the effect of the neutron spectrum on permanent displacement damage is fair and results presented are encouraging. A large portion of the discrepancies can be attributed to inadequate dosimetry.