

Conference Reports

ELECTRONIC COMPONENTS CONFERENCE

May 12th–14th, 1975 Statler Hilton Hotel,
Washington, D.C., U.S.A.

Of the 79 papers presented 43 were specifically addressed to hybrid processing, production and reliability. The balance were divided among fibre optics (5), capacitors (12), components (16), and testing (3). While this preponderance of hybrid emphasis created some competitive forces on participants, in general an attendee was not faced with a need to be in more than one of the three simultaneous sessions — a rather superior job in a meeting of this complexity. I found myself in this dichotomy principally on the second afternoon when sessions on hybrid standards and hybrid materials were unfortunately placed against each other.

While the quality of papers covered a fairly normal range, the presentations must be rated as good to excellent more often than average to poor. Discussions were relatively open and in one or two cases quite lively.

The simultaneously held Design Engineers Electronic Components Show was relatively small (43 exhibitors) and certainly not so well attended as the sponsors could have wished.

The Tuesday evening banquet was addressed by John A. Hornbeck, Vice-president, Electronics Technology of Bell Laboratories on Electronics of the future.

High interest and attention was devoted to several specific technological areas as noted below:

1. Beam Leads and Tape Processes/Devices

While beam leads have been eagerly awaited and sometimes avidly sought by hybrid fabricators, the notable lack of enthusiasm on the part of semiconductor manufacturers has severely limited the availability of these devices. It would now appear, as was proposed by several conference participants, that the beam tape approach to semiconductor lead attachment is about to emerge as a significant volume process in preference to beam leads. This trend is undoubtedly encouraged

by the amenability of tape processes to the mechanization and/or automation of discrete product assembly. While current beam-tape processes seemed centered on gold bumped chips and copper beams, as in the GE process of the late 60's there were several indications that the system may ultimately become an all aluminum one. Even so — this process will undoubtedly be limited, at least at first, to products of significantly high volume such as those engendered by the automotive and calculator fields.

Perhaps the most controversial paper at the conference was "The Effect of MIL-STD-883 Screening and Stress Test Upon Beam Lead IC's by JJ Mazenko of Hughes Aircraft Co. The study concludes that "...beam lead devices do not satisfy the promises of..... (increased reliability and decreased cost..)". This was rather vigorously contended by representatives of several arms of the Bell System. While both parties were obviously prepared with data there is no simple conclusion to be drawn. To this reviewer the conclusions of the study are over stated yet the questions posed by the data require serious consideration by both users and vendors of beam lead devices.

2. Co-utilization of Thick and Thin Film Technologies

Three more approaches to this apparently desirable goal were presented at the Conference. Khanna of Bell Laboratories utilized a thick film conductor interface between thick film resistors and thin film conductors in constructing an impedance matching amplifier. Murasumi, et al of Fujitsu Ltd used a thick/thin film combination for through-hole interconnection to fabricate thick film circuitry on the reverse side of a thin film substrate. Both a wide band amplifier and an active filter constructed in this way were displayed. The work presented in this effort was impressively thorough and detailed. Reiss of GTE Sylvania employed a vacuum deposited copper-gold film of 0.8 to 1.2 μm thickness. This film

when fired at 1000°C, adheres by apparently the same mechanism as normal "fritless" golds yet provides, via photo etching, a fine line capability as well as compatibility with standard thick film materials.

3. Reliability and Standards

The panel discussion on hybrid standards drew a surprisingly small audience of 30-40, probably due to the scheduling mentioned above plus a general awareness of the on-going programmes by a large portion of the attendees. The current efforts to establish realizable methods for reliability assurance on military hybrids was the main thrust of discussion.

Two papers — Caruso, Kinser, and Graff of NASA/Vanderbilt U., and Lasch of Raytheon pursued the problem of capacitor attachment. Galloway, et al of NBS outlined several instances of severe device degradation because of and during SEM examination and showed this to be essentially equivalent to similar degradation under gamma irradiation.

Davy of Westinghouse presented "Model Calculations for Maximum Allowable Leak Rates of Hermetic Packages" and made a cogent argument for an in-depth re-examination of existing test methods and acceptance criteria.

4. Gold Thermocompression Bonding Mechanism

Four papers from Bell Labs, Sandia and Western Electric presented an in-depth study of this extensively used process. Svitak and Ahmed described both theoretical and experimental data on the forces and movements at the bond interface with the conclusion that interface stretching is the primary requisite for a good bond. Shearing at the interface helps but may not be necessary. Jellison briefly described a microshear tester for evaluating bond strength. Experimental results not only reinforced the need for cleanliness but also indicate that — like good wine — gold to gold bonds improve with age. Dais performed an analysis of forces involved in beam lead bonding and recommends beam geometries for optimum process performance. Hall et al evaluated the bonding of gold plated copper beams and recommend a barrier layer to prevent bond degradation.

5. New Materials and Processes

Gosselin et al of DuPont described a thick film resistor ink series with TCR's of less than 50 ppm from 100 to 10⁶ ohm per square. Intended for potentiometer applications, the material may also be applicable to hybrid circuits. Shapiro and Merz of TRW described a series of non-noble resistor inks still in the developmental stage.

6. Other Technologies

Fibre optics while still an immature technology is greatly desired because of its immunity to Electro-Magnetic Interference. Connectors and fittings appear to be a present major concern. The attention devoted to standardization and to the determination of Industry trends indicates that hybrid technology is approaching a reasonable level of maturity.

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Proceedings

The Proceedings are available from the I.E.E.E., 345 East 47th Street, New York, NY 10017, U.S.A.

ELECTROCHEMICAL SOCIETY SPRING MEETING
May 11th—16th, 1975, Toronto, Canada.

The Spring meeting of the Electrochemical Society was held in Toronto, Canada between May 11th—16th, 1975. Several sessions were held which are of interest to the field of components.

The first session of interest was on Dielectrics. In total 13 papers were presented, 8 of which were in a special session on Ageing and Time Dependent Breakdown in Dielectrics and Insulators. Another session of the conference was concerned with Anodic Oxide Films and 39 papers were given.

The session on Thin Films also contained material of interest. The session was divided into two parts, the first being concerned with Thin Films and interfacial reaction studies by Rutherford Scattering. A total of 27 papers were given in this area.

The second part of the session dealt with Protective Coatings and Encapsulations, in which 6 papers were given.

The extended abstracts of the meeting are available as Vol. 75-1 from the Electrochemical Society Inc., P.O. Box 2071, Princeton, New Jersey 08540, U.S.A.

