

Conference Reports

Reports for publication in this section should be forwarded either to Prof. D. S. Campbell or Dr. C. A. Neugebauer

THE INTERNATIONAL RELIABILITY PHYSICS SYMPOSIUM

This symposium was held at Las Vegas, Nevada on April 2nd–4th, 1974. Although most of the papers presented were concerned with semiconductor devices and failure mechanisms associated with them, there were several papers of importance in the study of other devices. These included a paper on the failure of nitro-resistors as studied by X-Ray photo-electronic spectroscopy by Baitinger, Winograd, Amy & Munarin, Purdue University and Reliability Aspects of micro-fusible links programmable read only memories by Franklin, Burges of Monolithic Memories Inc., Sunnyvale, California. High current density effects were discussed in an entire session and metallisation, metallurgical effects and bonding in another session.

Complete Proceedings of this Symposium will be available for purchase from I.E.E.E., Inc., Editorial Services, 345 E. 47th Street, New York, N.Y. 10017. The price is \$15 per copy and a 25% discount is allowed to I.E.E.E. members.

OPTICAL AND ACOUSTICAL MICROELECTRONICS SYMPOSIUM

Optical microcircuitry is a recently developed technology made possible by the invention of controllable, coherent light sources. This technology, employing optical counterparts of radio frequency and microwave techniques, is having a strong impact on the traditional fields of electronics.

Rapid developments have also occurred over the last few years, in the field of microwave acoustics. Using surface acoustic waves, miniaturised signal processing devices have been constructed which permit substantial reduction in size, weight and power consumption and yet have improved performance and reliability.

Both optical and acoustical microelectronic devices involve wavelengths of approximately $1\ \mu\text{m}$ and

are similar in many ways – in the guiding structures, in the theoretical techniques which are applied and in the materials and fabrication technology. However, devices which have been designed so far and the system applications to date, are in the main dissimilar. A Symposium has therefore been held recently which attempted to chart the directions of growth of these two fields and determine in what ways they could further exchange techniques and applications.

There were sessions associated with optical and acoustical devices themselves, there were sessions on signal processing waveguides, fabrication techniques and material properties. There were also long sessions associated with present and future systems and in particular, the imaging and interface with biology.

The Symposium was held on April 16th–18th, 1974 in New York and the Proceedings of the Symposium will be published in the Autumn of 1974 as a clothbound Volume 23 for the Microwave Research Institute Symposia Proceedings. These Proceedings will be obtainable from the Polytechnic Institute of New York, 333 Jay Street, Brooklyn, New York 11201, U.S.A.

24th ELECTRONICS COMPONENTS CONFERENCE May 13th–15th, 1974, in Washington

The Electronic Components Conference is an annual event sponsored jointly by the Parts Material and Packaging Group of the I.E.E.E. and the Electronics Industries Association. It is very largely a United States affair with some additions from Japan and Canada. This year there was an exhibition by some two dozen manufacturers drawing attention to their more recent products. As the stands were attended by engineers and senior executives as well as salesmen it was well worth a tour.

There was also a banquet preceded by a cocktail party and accompanied by a very cool draught from the air-conditioning plant. It was followed by an

address by Mr. M. D. Margolis of Rockwell International Electronics Group that painted a rosy picture of the future in which the citizens would pass their time pressing the buttons on electronic contrivances that would then do all their minor chores for them. What else the future held, beyond full order books for component manufacturers, he did not attempt to guess.

Among the subjects discussed were displays, reliability, contacts, hybrids, thin and thick film components and technology. Thick films were very much to the fore. The components and techniques described tended to be on the verge of production rather than in the research stage.

It was interesting that Westinghouse (E. W. Greeneich and F. C. Luo) and their Government associates (E. Schlam, J. Velasquez and I. Reingold) put in two papers on thin film transistors. These fit in well with certain types of display since they can be deposited on the substrate that supports the display screen in a pattern suited to the operating system: this avoids fanning out leads from L.S.I. packages distributed round the screen, which is an alternative technology.

In displays liquid crystals were accepted as available. Little was known about the electrophoretic variety. Burroughs (T. Maloney) were showing a plasma display and have installed them in planes and cars but their luminosity seems to be on the low side. S. K. Deb of the Optel Corporation showed interesting slides on the behaviour of electrochromics based on tungstic oxide but it seemed early days yet. R. Haitz of Hewlett-Packard discussed the gallium arsenide phosphide light emitting diodes which are now well established.

In the thick film area it was interesting to hear of attempts to escape from highly priced precious metals. C. Y. Kuo of Engelhard described an air-firable nickel based paste for depositing conductors and J. F. Burgess, G. T. Flanagan and C. A. Neugebauer of General Electric described how thin foils ($>25 \mu\text{m}$) of copper can be fired directly on to alumina in a low oxygen atmosphere for subsequent photoetching into a lead pattern. Cuprous oxide is formed and combines with copper to form a liquid eutectic and with alumina to form a spinel. The joint is as likely to break in the alumina as anywhere when sufficiently stressed.

It was interesting to learn that K. Niwa, J. Nakamura, K. Murakawa and M. Nakamura of Fujitsu have produced a new alumina doped with magnesium and chromium oxides that gives a fine enough finish to allow tantalum based thin film capacitors and

resistors to be deposited on it without glazing. J. Yamazaki, T. Kamo and N. Nakamura have developed a tantalum-aluminium-nitrogen thin film system for resistors and capacitors.

There were several papers on the use of lasers for trimming thick and thin film components. This technique is preferred to airborne abrasive methods because it is cleaner, and at high speeds more precise, though the initial expense is considerably greater. V. Hukee and D. Burks of Sprague described a system in which a thin metallic deposit was laser trimmed through a superimposed layer of glaze.

The fabrication aid for hybrid circuits described by R. Y. Scapple and F. Z. Zeisten of Hughes Aircraft aroused interest. It virtually consists of complete wiring instructions deposited on the substrate so that the operator need not look up from the microscope during assembly. They have shown that the resist can be safely left there after assembly is complete.

The ability of the authors to put over their papers was as variable as at most conferences. A. Stirling of Chalk River Nuclear Laboratories gained my prize for delivery. The paper (co-authors R. Martin and R. L'Archevêque) concerned the variables in the silk-screen process and reached the conclusion that there is only one significant variable: the ink.

Thick and thin film capacitors continue to be the subject of papers while in practice chips are mostly used. Bacher and Rosenberg described some of the techniques needed to avoid pinhole faults in silk-screened dielectrics. A paper by W. L. Moore and A. W. Smith of Mallory on silver migration in wet tantalum capacitors concentrated on the possibility of developing a short circuit: their life tests shown no deterioration of capacitance value under high ripple conditions. J. Burnham of Hughes talked about failure in solid tantalum units at temperatures up to 250°C . The rise in leakage current was found to be inhibited by oxygen under pressure. He indicated that the semiconducting properties of the tantalum oxide-manganese dioxide interface were worth investigating.

E. Both, U.S. Army Electronics Command, talked about polarisation processes in several dielectrics and expressed interest in the remarkable piezoelectric properties of polyvinylidene difluoride. A comparison of polypropylene with the present conventional dielectrics would be of interest. Polycarbonate is better than Mylar so far as freedom from charge absorption is concerned.

The use of rutile to provide a breakdown path between a pin and an earth plate was described by R. K. Traeger, H. C. Olson and L. J. Allen of the Sandia Laboratories. Surge protection is of increasing

importance in electronics and methods of achieving it in a small space are of great interest.

The Conference afforded a good opportunity of sampling the activity in a variety of component fields

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