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CARDIFF (WALES) R H WILLIAMS 31 DEC 84
DAJA45-84-C-0028

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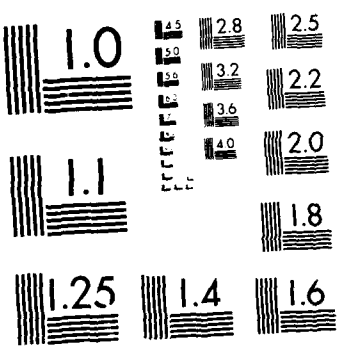
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METAL CONTACTS ON SEMICONDUCTORS

Principal Investigator: Professor R H Williams

Contractor: University College Cardiff

Contract Number: DAJA 45-84-C-0028

1st Periodic Report: 1 November 1984 - 31 December 1984

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The grant started on 1 November 1984. The aim of the project is to gain a detailed understanding of the nature of metallic contacts to semiconductors. In particular it is intended to concentrate studies on III-V n and p type semiconductors and also on contacts to multilayer and superlattice structures. There are many fundamental problems in this area which require to be understood in order for these materials to be fully exploited in communication technology.

We have been very fortunate indeed in the appointment of our research assistant to work on this project. We have appointed Dr Alistair Maclean who obtained a first class Honours degree in physics from the University of Strathclyde and has recently received his Ph.d from the University of Cambridge. His background is in tunnelling through point contacts into metal crystals and this background is rather suitable for the kind of work we plan. Since he arrived on 1 October, Dr Maclean has been acquainting himself with our surface science apparatus and has also been assembling our imaging photoelectron microscope which will be used in these studies. At the same time he has been giving thought to the scientific issues involved in this field and in assisting me in the planning of the initial experiments. At the present time we are depositing various contacts on to GaAs single crystals and examining the Schottky barriers formed in this case.

We have also started discussions with Dr Wood at GEC who is willing to grow the structures that we require for the programme by molecular beam epitaxial growth.

We are pleased with the progress to date on this grant and we hope to have some useful scientific results to report in the near future.

both the barrier height and the n value of the contact increase introducing a layer of BaF_2 with a thickness of 20 Å increased both the barrier height and the ideality factor. It has been shown that a mixture of CaF_2 and SrF_2 can be grown epitaxially on GaAs. It should be possible to investigate the properties of GaAs contacts with epitaxially grown insulating fluoride layers

At present epitaxially Al contacts to both n and p type GaAs are being prepared by GEC at the Hirst Research Centre. The I-V characteristics of epitaxially grown metal contacts to GaAs exhibit near ideal electrical behaviour. A comparison will be made between an epitaxial and a polycrystalline metal overlayer on both n and p type GaAs.

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