

# **Gallium Arsenide and Related Compounds 1984**

Invited and contributed papers from the Eleventh International Symposium on Gallium Arsenide and Related Compounds held in Biarritz, France, on 26–28 September 1984

Edited by B de Cremoux

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## Preface

The 11th International Symposium on Gallium Arsenide and Related Compounds was held in Biarritz, France on 26–28 September 1984.

The choice of Biarritz as the conference town was made because it is the location of a new experimental multiservice fibre optic system, illustrating the use of GaAs based devices in communications. Biarritz is also a beautiful city on the shore of the Atlantic Ocean.

This symposium is increasingly successful as demonstrated by the number of submitted papers (250 regular plus 12 late news) and the 420 attendees from several countries all around the world. The technical programme committee thus had the difficult task of making a selection among papers with a generally high level of quality and decided to arrange poster sessions for the first time in this series. 113 papers were accepted for oral presentation, including 9 late news, and 25 were accepted as posters depending on their suitability for each type of presentation. To illustrate the capabilities of the Biarritz fibre network, each poster paper author was allowed to record a 5 minute 'video clip' which was afterwards made available on the connected TV sets.

It is worth noting that, besides the now classical fields of interest in III–V compounds, an increasing amount of attention is being paid to two-dimensional structures, properties and applications: 5 papers in this area had been selected for the previous symposium in Oiso, Japan, while 13 have been presented in Biarritz.

The symposium proceedings give the papers accepted for oral or poster presentation arranged in 9 chapters. The first comprises two introductory invited papers aimed at showing the industrial impact of GaAs based devices and describe the Biarritz optical fibre system and the commercial prospects of GaAs IC's, respectively. Chapters 2 to 8 are respectively devoted to bulk growth and implantation, epitaxial growth, characterization, two-dimensional structures, optoelectronic devices, discrete microwave devices and IC's. Finally chapter 9 gathers together the late news papers.

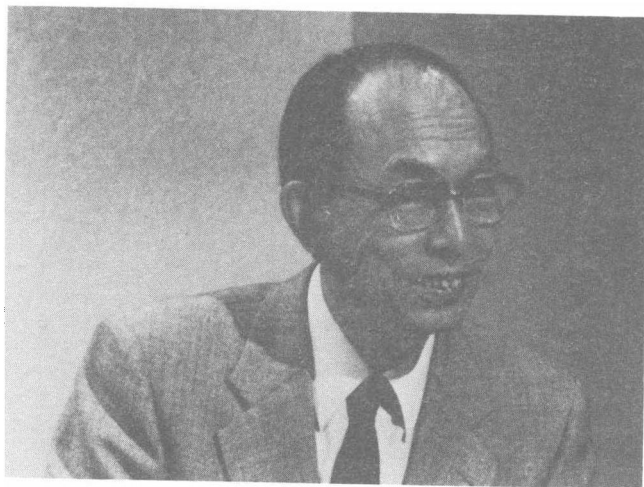
**B de Cremoux**

## **GaAs Symposium Award and Heinrich Welker Gold Medal**

The Gallium Arsenide Symposium Award was established in 1976. Candidates for the award are selected by the GaAs Symposium Award Committee from those who have distinguished themselves in the area of III–V compound semiconductors. The award consists of \$1000 and a plaque citing the recipient's contribution to the field. In addition, the Heinrich Welker gold medal, sponsored by Siemens, is also presented to the award recipient.

The first Award and medal were presented to Nick Holonyak of the University of Illinois for his work leading to the development of the first practical light-emitting diode and his continuing research in III–V compound semiconductors. Cyril Hilsum of the Royal Signals and Radar Establishment (now at GEC Research Laboratories) received the second Award and medal in 1978 for his contributions in the field of transferred-electron devices and his leadership in III–V compound semiconductor research. The 1980 Award and medal were presented to Hisayoshi Yanai, University of Tokyo, for his contributions to progress in transferred-electron logic devices and the advancement of GaAs MESFETs. In 1981 the GaAs Symposium Award and Heinrich Welker gold medal were presented to Gerald L Pearson, Stanford University, for his research and teaching in the field of compound semiconductor physics and new device technology. In 1982 the Award and medal were presented to Herbert Kroemer, Professor of Electrical Engineering at the University of California at Santa Barbara (UCSB) for his contributions to hot-electron effects, the Gunn oscillator, and III–V heterojunction devices including the heterojunction laser.

The 1984 GaAs Symposium Award and Heinrich Welker gold medal were made to Dr Izuo Hayashi for his many contributions to the development and understanding of room temperature GaAlAs/GaAs double heterojunction lasers.



Dr Izuo Hayashi graduated from the Department of Physics, University of Tokyo and MIT in 1964, and then joined Bell Telephone Laboratories. There he first worked on semiconductor high energy particle detectors, while taking a growing interest in the basic understanding of semiconductor lasers. He invented the GaAlAs/GaAs double heterojunction laser, and was the first in the world to demonstrate continuous laser oscillation at room temperature. In 1971, he returned to Japan and joined the Central Research Laboratories, NEC Corporation, to lead semiconductor laser research and development. His great contributions in understanding laser degradation and the means of improving laser life are well known. In 1981, when the Optoelectronics Joint Research Laboratory was established as a Japanese national project, he joined as chief scientist. Under his leadership, the laboratory has become world famous.

Dr Hayashi is a Fellow of the IEEE and a recipient of the Ichimura Prize and Achievement Award of the Institute of Electronics and Communication Engineers of Japan for his breakthrough on long life laser diodes.

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## **From the multiservice fiber optic system in Biarritz to the development plan for videocommunication**

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**Abstract:** The Biarritz fiber optic system is, at the same time, the first step in the field of local videocommunication networks and a long term futuristic performance in terms of services, either distributed or switched. It prepares for the short term introduction of optronics in local telecommunication networks, while it provides a realistic test for new services, ranging from CATV to videophony, and from video on request to picture banks.

As the French Minister of PTT, Mr Mexandeau, has just said to you, there is consistency between the multiservice fiber optic system in Biarritz and the development plan for videocommunication that was decided two years ago on his proposal. Firstly, the services provided by the Biarritz network anticipate those to be offered in future videocommunication networks. Secondly, the building of this system has launched the French telecommunications industry into the age of optronics.

The first original item of the Biarritz network is the switched services proposed to subscribers.

The switched services at Biarritz provide for the establishment of bidirectional audio and audio plus picture connections. The main applications are:

- Videophony, in which two people can not only talk to one another, as in telephony, but also see one another, if they wish. Communication is visual only if both parties agree. When one of the parties does not want to be seen, the call is voice-only, preventing any unwanted intrusion into subscribers' private lives.

Picture quality is good enough for one correspondent to read a document placed by the other in front of his or her videophone camera. For greater flexibility in this respect, the videophone cameras have adjustable positions.

The videophone cameras are monochrome, because lighting in private homes and apartments tends to be inadequate for good color filming. It is, however, possible to use color cameras in professional premises with suitably designed lighting. In addition, subscribers can connect their own color video cameras or VCRs to the videophones and use them in transmitting over the picture channel. All the videophones at Biarritz



have color tubes and are thus capable of receiving and displaying both monochrome and color pictures. In addition they can send to the TV set the image and sound that they receive for a better display.

- Telephony. For calls to and from locations inside or outside the Biarritz optical fiber network, including intercity and international calls, subscribers use either the videophones (in the voice-only mode) or ordinary telephones predating the new network, as they prefer.

- Videotex. Using their videophones, subscribers have access to a range of information and transactional services similar to those developed for the French videotex system TELETEL (1), plus Biarritz network directory information.

- Supervideotex, following the installation of an automated videobank in the Biarritz network at the end of 1984. Supervideotex and the use of the videobank are explained later.

The preceding list of services is not exhaustive. The Biarritz network is a testbed and has been built for easy integration of additional services. In the final resort, the services offered and their exact scope will depend partly on the use made of the network and on the opinions and wishes of the participating subscribers.

The second original item, in terms of services, is the simultaneous distribution of TV and HiFi sound channels to the subscribers on the same fiber optic transmission system.

The network is engineered for interactive distribution of 15 (2) moving picture channels and 12 stereo sound channels. The moving picture channels are used for signals delivered to subscribers' television sets. Most of the channels are dedicated to TV broadcasts, including the three French public service channels, 2 channels from nearby Spain, a French-language channel from Belgium, one channel from Switzerland and BBC 1 from the UK transmitted through a microwave link, and two satellite-transmitted channels (Sky Channel and TV 5). However, users will also have access to a large choice of films, documentaries, etc, in a local program bank.

This program bank has been installed since May 1984, initially with manual operation. It will now be progressively automated until the middle of 1985. Subscribers will use the videotex terminals of their videophones to interact with the program bank for "à la carte" and "on request" program selection. The corresponding videotex host computer will have a capacity of 80 simultaneous calls.

One of the 15 moving picture channels provides a split-screen "mosaic" display of all on-cable programs for pushbutton selection by users through the handheld control unit. The same channel will be employed for announcing future programs and pay-per-view events, for explaining to subscribers how to make optimal use of their terminals and of the network, and so on.

The sound channels, now giving six French and Spanish public service channels, will also carry "on request" programs within the next few months for testing this new way of using sound material.

(1) 500 000 terminals at the end of 1984

(2) with a possible extension to 30