GaAs/AlGaAs were fabricated in India by the technique of LPE at Solid State Physics Laboratory (SPL), Delhi. One of the first comprehensive texts on the subject entitled 'Semiconductor Heterojunctions' still widely referred to in the literature was written by Sharma and Purohit of SPL and published in 1974. Studies on semiconductor heterojunctions have since been carried out at TIFR, Mumbai and Indian Institute of Technology (IIT) Kharagpur among other laboratories.

The idea of the heterojunction was first proposed in 1951 by none other than Bill Shockley, one of the discoverers of the transistor at Bell Labs (of fertile mind and unbridled ambition) who left Bell Labs and later found the unsuccessful Shockley Transistors in Silicon Valley. However, it was Herb Kroemer in 1957 who actually designed a heterojunction transistor using this idea. At that time the transistor had a long way to go and the drive was on to get smaller devices manufactured by the millions to operate at higher frequencies. So the idea of heterojunctions had to await the advent of first LPE and then molecular beam epitaxy (MBE) and organometallic vapour phase epitaxy (OMVPE) which allowed the growth of single-crystal layers. Kroemer's ideas came into their own only in the seventies and eighties. The new device that resulted is called the heterojunction bipolar transistor (HBT) which gives improved performance over the conventional homojunction silicon device. The key idea in a HBT is to make the emitter of the transistor out of a wider band-gap material than the base, which improves the efficiency as well as the speed. HBTs are now made of the new SiGe alloy which can be integrated into the Si chip. The fastest devices working at frequencies up to few hundred gigahertz (10^9 Hz) are HBTs made of group III–V semiconductors such as indium gallium arsenide grown on indium phosphide (InGaAs/InP). This is because InGaAs has the highest electron mobility among the commonly used semiconductors and alloys, higher than even GaAs – typically 12,000 $cm^2/V.s$ compared with 8000 $cm^2/V.s$ for GaAs and only 1800 $cm^2/V.s$ for silicon.

Other important applications of heterojunctions are in the fabrication of high-efficiency photovoltaic devices – solar cells. The idea is that semiconductors with different band-gaps can be 'tuned' to different parts of the solar spectrum, which is not possible with a single semiconductor such as silicon. Thus tandem solar cells based on InGaP/GaAs/Ge with band-gaps of 1.9, 1.4 and 0.67 eV, respectively have been developed and used in the latest space satellites to give efficiencies of 28% compared with 16–18% for silicon.

Suggested reading

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3. Sharma, B. L. and Purohit, R. K., *Semiconductor Heterojunctions*, Pergamon, 1974.

D. N. BOSE

Advanced Technology Centre,
Indian Institute of Technology,
Kharagpur 721 302, India
e-mail: dnb@matsc.iitkgp.ernet.in

Painful lesson from interaction with the media

I suddenly found myself in the middle of a controversy created by the print (*The Sunday Times* dated 28 January 2001) and television (*Zee TV*) media with regard to the 26 January 2001 Bhuj earthquake, much to my regret and surprise. The media have misquoted and misrepresented some of my statements and have used some excerpts from my research papers[1–3] out of context. I have come under the limelight because of my project in the Great Rann of Kachchh. I have been quoted as saying that I had given a warning of the 26 January Bhuj earthquake in a report submitted to the Department of Science and Technology, New Delhi and the warning was ignored by the authorities. I have never said this nor have I ever warned about this earthquake or communicated this by way of any report to any agency. This was a gross misrepresentation of facts. It is true that I worked in the Rann of Kachchh, at the epicentre of the 1819 earthquake, a site located far from the epicentre of the present earthquake. It is true that we have worked out the recurrence period of that earthquake, which is only one of the steps to understand the seismic hazard posed by the fault called Allah Bund, the causative structure of the 1819 earthquake. However, this has no bearing on the prediction of the present earthquake, which probably occurred on a parallel fault, located far to the south. Therefore, qualifying my work in the region as a prediction study of the current seismic event goes against my own understanding of the earthquake processes. What, in fact, I stated was that the Kachchh seismic zone lies in the high-risk region which contained several potential faults and that we should have used this fact and all such scientific inputs, including my work to understand better the long-term seismic hazard of the region. This statement should not have been construed as my warning to the authorities for the impending earthquake. *I wish to place it on record that I have never made any prediction of earthquakes nor have I submitted any report containing this warning.* I have sent rejoinders to the daily, which published the reports containing incorrect statements and quotations. I have also given a statement to the TV channel through telephone, clarifying my stand.

Having learnt a painful lesson from the interaction with the media, I wish to share this with the readers, so that one is aware of such pitfalls.

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2. Rajendran, C. P., *Curr. Sci.*, 2000, **79**, 1251–1258.
3. Rajendran, C. P., *Bull. Seismol. Soc. Am.*, 2001 (submitted).

C. P. RAJENDRAN

Centre for Earth Science Studies,
Akkulam,
Thiruvananthapuram 695 031, India
e-mail: rajen@md3.vsnl.net.in