
LASER-SOLID INTERACTIONS

This symposium was a continuation of the series of "Laser Annealing" symposia that started at the MRS meeting in 1978. The 1982 symposium contained new studies of defect annealing by lasers but even more attention was devoted to new rapid thermal processing methods involving incoherent heat sources. In addition, a major emphasis of the symposium was unrelated to defect annealing and focused on new methods of preparation of materials either by growth from the molten phase at very high speeds or by lateral epitaxy on noncrystalline substrates. Several main themes were evident in the symposium

Laser-solid interactions, energy transfer and fast phase transformations continued to be

topics of active interest. Time-resolved laser techniques were reported in the picosecond and even subpicosecond regimes. In general, measurements of optical reflectivity and transmission as well as time-resolved x-ray diffraction and electrical conductivity and TEM studies of resulting material structures gave a picture of rapid (1-10psec) conversion of high intensity electronic excitation to heat with rapid phase changes to, and subsequently from, the molten state. However, time-resolved Raman measurements in the nanosecond regime continue to present a puzzling and conflicting picture as both the measurements and their interpretation are refined. Maximum Raman temperatures well below the



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melting point of silicon continue to be deduced under conditions in which other results indicate that melting occurs.

Rapid thermal annealing of silicon and compound semiconductors is being pursued with an ever-expanding array of non-laser heat sources. At the symposium, these included scanning electron beams, quartz halogen lamps, mercury arc lamps, vortex cooled argon arc lamps, and graphite strip heaters. Annealing was typically carried out in times of 0.1 to 10 seconds. Reports were presented of very high quality

material produced in this rapid, but not superfast, processing.

Undoubtedly the technologically most exciting area discussed at the symposium was that of lateral epitaxy of silicon on insulating, noncrystalline substrates: SOI, or silicon-on-insulator. These crystal growing processes are being carried out under a number of different conditions by different workers. They involve a wide variety of heat sources from lasers to hot graphite strips. In general, they result in thin films of crystalline silicon with thicknesses from 0.2 to 100 micrometers and with grain sizes as large as millimeters. Control of the lateral growth interface by control of thermal gradients has reached a high degree of sophistication as has the understanding of the stabilization of the growth process. Very high quality devices are being fabricated in this material which promises to have a unique role in the production of dielectrically isolated devices and in very large and inexpensive device arrays.

The symposium consisted of eight oral and one poster session. The oral sessions, which included 23 invited and 54 contributed papers, attracted audiences as large as 300, with particular interest in the sessions on energy transfer, phase transitions and crystallization of silicon on amorphous substrates. The display of



G.A. Rozgonyi (foreground), Bell Labs, at a Symposium A poster session

30 posters was available for study throughout the symposium but was specifically manned by authors on Tuesday evening, with a large number of interested participants taking advantage of the opportunity to discuss new results in depth and detail.

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number in the Materials Research Society Symposium Proceedings Series. Non-participant MRS members will be informed through the *Bulletin* of the publication of this volume, which will be offered to members at a substantial savings.

The MRS-sponsored symposium on phase transformations follows another meeting of interest to many members. It is the NATO Advanced Study Institute on Modulated Structure Materials, also held at the

Crete Chandris Hotel in Maleme, Crete. That meeting, to be held June 15-25, will include presentations on crystallography of MSM, diffraction methods, long-period ordered structures, electrical, magnetic and mechanical properties of MSM, theory and statistical mechanics of order-disorder transitions, synthetic layered structures, molecular beam epitaxy technique and semiconductor lattices.

Information about that meeting, as well as the one sponsored by the Society, is available from Tsakalacos.