sponse. *A. Penzkofer* (Univ. of Regensburg, FRG) reported on solution measurements of third harmonic generation. All are agreed that the effects are very fast—sub-picosecond—but *G. I. Stegeman* (Univ. of Arizona, Tucson, USA) underlined the need to consider figures of merit, which indicate that the present materials are several orders of magnitude short of usability, and require somewhat reduced attenuation and larger response. Rather than improve conjugated polymers, *K. J. McEwan* (Royal Signals & Radar Establishment, UK) tried to trade off some of the extremely high third-order response of mesogens to improve their response time and light scattering, by operating them in the isotropic phase.

Finally there were a number of talks on the general topic of Langmuir-Blodgett films. *Y. R. Shen* (Berkeley, USA) characterized the structure of monolayers on the water surface on the basis of their second harmonic generation, while *C. Bubeck* (Mainz, FRG) reported only on linear effects, mainly polarized spectroscopy, to determine the structure of deposited polymeric films. *M. C. J. Young* (Univ. of Lancaster, UK) reported some preliminary results on electro-optic response but agreed with the author of this report that optical scattering should now be the focus of applications-oriented research.

In addition to the lectures, there was a well-subscribed poster session reporting many interesting variations on the main themes discussed above, and which there is not space to review in detail here. The Proceedings of the conference are to be published by the Royal Society of Chemistry. Because of the general satisfaction all around, a further conference to be called OMNO '90 is planned in two years' time, also to be sited in Oxford.

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European MRS Meeting in Strasbourg

Strasbourg, May 31st. No sign or poster can be seen to indicate that more than 550 highly specialized engineers and scientists from nearly all European countries and from overseas are going to meet over the next three days for an exceptional conference at the Council of Europe. Security guards routinely check the hand baggage at the entrance, a cool and impersonal climate welcomes the attendees. The atmosphere belongs to the place where European politics are handled, a place prepared for diplomatic round-table discussions rather than for the presentation of slides, transparencies and posters.

Four symposia on important aspects of materials research—high-tech ceramics, irradiation assisted processes, deep implantation and metastable alloys—were held simultaneously at the spring conference of the European Materials Research Society (E-MRS) from 31 May to 2 June 1988. "Ceramic materials research", organized by *R. Brook*, FRG, was devoted to problems of fabrication, characterization, and application of advanced ceramics and of what one could call "highly developed classical ceramics". The central topics were preparation and treatment of powders with small grain size and/or high purity (key words: "submicron powders", "zero-flaw processing"), molding processes, microstructural features caused by densification, and the resulting mechanical, thermal and electrical properties. Presentations on the mechanical testing of components, and on the statistical evaluation of flaw populations and their relevance to lifetime predictions, provoked intensive discussion; it becomes increasingly obvious that there is generally a tremendous lack of knowledge on the high-temperature behavior and on the fatigue properties of ceramics under cyclic loading. From a special session on superconductors one could form the view that the development of new compositions with higher T_c values is now stagnating, and as a result the presentations have less dramatic impact. Interest has consequently shifted to more pragmatic problems, e.g. to the preparation of well specified powders of the most promising compositions by sol-gel techniques and to the development of homogeneous microstructures with tailored grain boundaries.

The topic of the symposium on "Photon, Beam and Plasma Assisted Processing", chaired by *I. W. Boyd*, UK, and *E. F. Krimmel*, FRG, covered surface modifications of bulk materials, thin film techniques, and the preparation of high-purity powders. The compounds treated ranged from precursor materials for semiconductors and their dopants to multiply-alloyed steel. Many different deposition processes were described, and their applicability in, e.g., doping, ion beam mixing, epitaxy, recrystallization, decomposition and etching was discussed; there were also lectures on computer-assisted modeling of beam-surface interactions and characterization techniques.

Modification of semiconductors was also the most important point of interest in the session on "Deep Implant; Fundamentals and Application", directed by *G. G. Bentini*, Italy, *A. Golanski*, France, and *S. Kalbitzer*, FRG. Many lectures showed the high standard of computer simulation of ion beam interaction with matter, which can predict penetration and damage profiles in both lateral and transverse directions as a function of energy and dosage. Concerning applications, the topics were clearly governed by the interests of semiconductor research. For doping Si- or GaAs-based substrates, the trend in equipment is shifting

to large-scale MeV facilities with high current densities. Unfortunately, the topic of increasing the wear resistance of metals and ceramics by ion implantation was not addressed at all.

The symposium on "Preparation and Properties of Metastable Alloys", organized by *K. Samwer*, FRG, *M. von Allmen*, Switzerland, *J. Bottiger*, Denmark, and *B. Stritzker*, FRG, dealt with the thermodynamic aspects of metastability, the amorphization of crystals, the preparation and nucleation of undercooled liquids, the relaxation of amorphous matter, quasicrystals, ion beam modification, and the properties of metastable alloys. Although these topics seem to be rather exotic they are of high relevance not only for scientific insights but also for economic reasons; many industrial processes such as the preparation of superalloys, amorphous metals or thermodynamically impossible compounds will be able to employ such methods as powder atomization, tape casting or melt spinning to create new materials with potentially attractive properties if the basic problems of, e.g., nucleation and reaction kinetics, are understood.

Since all four symposia covered nearly every type of material from metals to ceramics, as well as all methods of preparation and characterization, all the sessions were equally attractive for the attendees. The meeting was therefore also an important opportunity to make contact with diverse groups of specialists in order to discuss new points of view and to consider unconventional strategies for solving particular problems. On the other hand, the mixing-up of related topics in four or even six parallel sessions does not permit a suitable choice of lectures without hurrying along the corridors searching out the particular room for the next session, a procedure which is even more difficult if the time schedules are not rigidly followed.

One of the advantages of this E-MRS conference was that many speakers could take part who do not normally have the opportunity to present their research in a genuinely international forum. Moreover, for many "junior scientists" Strasbourg was a very first opportunity for an international debut oral presentation before a highly expert audience; this was recognized by awards for the best presentations.

Amongst the many new competing, profit-oriented and routinely organized conferences on materials science, the merit of the annual E-MRS meeting is that it appears to be a forum specifically for European researchers—though, of course, also open to non-European attendees. The organizing committee should go on with its encouraging efforts by making further use of the charming atmosphere of the city of Strasbourg for the Fall meeting to be held on November 8–10, 1988.

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Research News

Ring Opening Metathesis Polymerization—Recent Developments

Ring opening metathesis polymerization (ROMP) originated in the late fifties and mid sixties when *Anderson, Dall'Asta* and *Natta* showed that strained cyclic olefins polymerize with breaking of the CC double bond in the presence of transition metal catalyst systems.[1] These observations initiated the growth of a whole area of research which is now known as ROMP, and led to the commercialization of new hydrocarbon polymers such as Vestenamer (Hüls), Norsorex (Chimie de France) and Metton (Hercules).

Research initially concentrated on the scope and mechanism of the polymerization. During this process a measure of control of microstructure and molecular weight was obtained. After several false starts[1] the consensus favoured a chain growth mechanism with an alternating metallo-carbene/metallacyclobutane as the chain carrying species. This hypothesis was fully confirmed by *Grubb*'s elegant work with titanacyclobutane initiators.[2] This work of *Grubbs* et al. also initiated an exciting new phase in this research area by establishing well-defined, living metathesis polymerization. *Osborn* et al.[3] and *Schrock* et al.[4] have also described such well defined initiators.

The catalyst acidity is critical in these polymerizations, both if monomers tend to undergo electrophilically induced rearrangements and if monomers contain nucleophilic heteroatoms which may coordinate to the metal center and lead to undesired side reactions or poisoning of the catalyst. Thus, these novel, fine-tuned initiators significantly widen the variety of monomers susceptible to ROMP. Some examples of the recent achievement in this area are briefly described.

The tungsten complex $[W(O\mathit{t}Bu)_2(2,6\text{-}\mathit{i}Pr_2C_6H_3N)(CH\mathit{t}Bu)]$ turned out to be specific enough to open the CC double bond of benzvalene **1**, while leaving the sensitive bicyclobutane moieties untouched.[5] The same complex opened