[5] H. Hoegl, O. Sus, W. Neugebauer, US Pat. 3037861 (1962), Hoechst AG.
[6] D. M. Shattuck, U. Vahtra, US Pat. 3484237 (1969), IBM.
[7] R. M. Schaffert: *Electrophotography*, Focal Press, London 1965.
[8] J. Mort, D. M. Pai: *Photoconductivity and Related Phenomena*, Elsevier, Amsterdam 1976.
[9] L. Bachelier, *Ann. Sci. E.N.S. III-17* (1900) 21 (*"Théorie de la spéculation"*).
[10] F. Spitzer: *Principles of Random Walk*, Springer Verlag, Berlin 1976.
[11] H. Scher, M. Lax, *Phys. Rev. B 7* (1973) 4491, 4502.
[12] H. Scher, E. W. Montroll, *Phys. Rev. B 12* (1975) 2455.
[13] B. V. Gnedenko, A. N. Kolmogorov: *Limit Distributions for Sums of Independent Random Variables*, Addison-Wesley, Reading 1954.
[14] B. B. Mandelbrot: *The Fractal Geometry of Nature*, Freeman, San Francisco 1982.
[15] E. W. Montroll, G. H. Weiss, *J. Math. Phys. 6* (1965) 167.
[16] M. F. Shlesinger, *J. Stat. Phys. 36* (1984) 639.
[17] a) E. Müller-Horsche, D. Haarer, H. Scher, *Phys. Rev. B 35* (1987) 1273; b) H. Kaul, D. Haarer, *Ber. Bunsenges. Phys. Chem. 91* (1987) 845.
[18] F. C. Bos, D. M. Burland, *Phys. Rev. Lett. 58* (1987) 152.
[19] A. Blumen, J. Klafter, G. Zumofen in I. Zschokke (Ed.): *Optical Spectroscopy of Glasses*, Reidel, Dordrecht, Holland 1986, p. 199.
[20] A. Blumen, G. Zumofen, J. Klafter, *J. Lumin. 38* (1987) 320.
[21] F. W. Schmidlin, *Phys. Rev. B 16* (1977) 2362.
[22] J. Noolandi, *Phys. Rev. B 16* (1977) 4466.
[23] H. Schnörer, D. Haarer, A. Blumen, *Phys. Rev.*, in press.
[24] J. M. Marshall, *Phil. Mag. 38* (1978) 335; *43* (1980) 401.
[25] M. Silver, G. Schönherr, H. Bässler, *Phil. Mag. 43* (1981) 943; *Phys. Rev. Lett. 48* (1982) 352.
[26] T. Tiedje, A. Rose, *Solid State Commun. 37* (1980) 49.
[27] E. W. Montroll, M. F. Shlesinger in J. L. Lebowitz, E. W. Montroll (Eds.): *Nonequilibrium Phenomena II: from Stochastics to Hydrodynamics*, North-Holland, Amsterdam 1984, p. 1.
[28] H. Domes, R. Leyrer, D. Haarer, A. Blumen, *Phys. Rev. B 36* (1987) 4522.
[29] D. Stauffer: *Introduction to Percolation Theory*, Taylor and Francis, London 1985.
[30] R. Hilfer, A. Blumen, *J. Phys. A 17* (1984) L537; L783.
[31] S. Alexander, R. Orbach, *J. Phys. Lett. 43* (1982) L625.
[32] R. Hilfer, A. Blumen, *Phys. Rev. A 37* (1988) 578.
[33] I. Goldhirsch, Y. Gefen, *Phys. Rev. A 35* (1987) 1317; Y. Gefen, I. Goldhirsch, unpublished.
[34] G. Köhler, A. Blumen, *J. Phys. A 20* (1987) 5627.

Conference Reports

Organic Materials for Nonlinear Optics

The study of nonlinear optical effects in organic materials has been an active area of research for over ten years. These materials are now attracting considerable industrial interest through their potential for controlling and transforming laser radiation. The International Conference on Organic Materials for Nonlinear Optics, organized by the Royal Society of Chemistry and held at the University of Oxford, England, on 29–30 June 1988 (OMNO '88) was only one of several this year; there have already been meetings at Virginia Beach, USA, and Antibes, France, and the SPIE meeting in San Diego is yet to come. The roughly 160 delegates to OMNO '88 came from eight different countries and almost half were from industry. Its format of a single session over two days was just about right for covering the subject in depth while avoiding fatigue; the atmosphere was friendly, and the charming conference accommodation in historic Balliol College right in the center of Oxford assisted the lively evening socializing.

Fittingly, the first speaker (*J. Zyss*, CNET, France), who was among the founders of the field, spoke about the realization of one of his long-term goals, that of achieving parametric amplification in a single-crystal material. He has applied the technique as a very sensitive way of studying sub-picosecond phenomena. From his highly professional, extensively characterized and beautiful results, as well as those of *J. N. Sherwood* (Univ. of Strathclyde, UK) on crystal growth and *S. Allen*(ICI, UK) on electro-optic effects, it was apparent that second-order effects in single crystals are much better understood than any other aspect of the field. In fact, the conference heard the news that large, optical-quality crystals of 3-methyl-4-nitro-pyridine 1-oxide (POM) are now available on a commercial basis. *A. Gavezzotti* (Univ. of Milan, Italy) and *R. W. Munn* (UMIST, UK) had the design of future high-performance second-order crystalline materials in mind with their theoretical studies of molecular packing and local field effects, respectively.

Other excitement was generated by work on electro-optic effects in poled polymers. *D. R. Ulrich* (US Air Force Office of Scientific Research) gave well-reasoned arguments for his continued support of basic research in this area, and some experiments on these materials were reported by *G. R. Möhlmann* (Akzo, Netherlands) and *N. Carr* (Plessey, UK). However the most promising results were those of *J. R. Hill* (British Telecom, UK), and especially *R. Lytel* (Lockheed, USA), who appeared close to complete mastery of the technology. The electro-optic figures of merit reported are comparable with the best alternative materials, and the dispersion of dielectric constant much smaller. The major remaining task is to reduce levels of scattering.

In the area of third-order effects in conjugated polymers, there appears to have been a strategic retreat to understand the basic science. These materials, which were initially the front runners in the field, have now been faced with very effective competition from multi-quantum wells and other inorganic semiconductors materials. *P. Prasad* (SUNY, Buffalo, USA), *F. Charra* (CEN Saclay, France), *A. F. Garito* (Univ. of Pennsylvania, USA) and *D. Pugh* (Univ. of Strathclyde, UK) all attempted to understand the optical Kerr effect in terms of the interplay of molecular states, while *G. R. Meredith* (Du Pont, USA) also emphasized the contribution from cascaded second-order re-

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.

Ian R. Peterson
Institut für Physikalische Chemie
der Universität Mainz (FRG)

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