The primary focus of the symposium was the application of laser radiation to anneal ion implantation damage in semiconductor single crystals. This topic, which has been the object of intense recent interest, was fully reviewed and expanded to include metal-silicon surface alloying, epitaxial growth of amorphous Si on crystalline substrates, and ohmic contact formation in both Si and GaAs. In addition, recent advances in laser transformation hardening, surface alloying, surface desensitization, laser assisted machining, and laser melt quenching of metallic alloys were discussed.

The proceedings of the symposium will be published by the American Institute of Physics as a volume in their Conference Proceedings Series, and will be available in early 1980.

ACCEPTANCE REMARKS FOR THE VON HIPPEL AWARD OF THE MATERIALS RESEARCH SOCIETY, BOSTON SHERATON HOTEL, BOSTON, MASSACHUSETTS - NOVEMBER 30, 1978

W. O. Baker, President, Bell Laboratories

I am grateful for this occasion and to those who have created the Materials Research Society and, above all, to those whose work gives it meaning and content and continuity. A gathering like this puts people together so that we can see and say how human are science and engineering, how human is our striving to understand matter, and its coupling with the intangibles of the mind and spirit. To have been welcomed by my cherished colleague, Professor Rustum Roy, and then received by my esteemed associate, Ken Jackson, and his successor president, Rudy Voorhoeve, is for me a treasured experience.

Happily, adroitly, and artfully your group here, through your officers and committees, and program speakers and audiences, have combined these features in our context of today. Professor Arthur Robert von Hippel achieved his eighth decade of a distinguished life on November 19th. He joined the faculty at MIT some forty-two years ago, the year I began to study the dielectric properties of organic crystals in the early times of solid state science, at Princeton. This event is noted only because in the next year or two my first serious professional society affiliation came through the Conference on Electrical Insulation of the National Research Council, where Professor von Hippel's participation was already becoming prominent. By the time he was chairman of this activity of the National Academy of Sciences in 1952, he had already established his special cognition of the atomic and molecular role in the macroscopic properties of materials. This was later reflected in such important books as "Molecular Science and Molecular Engineering", 1959, and the "Molecular Designing of Materials and Devices", 1965. Thus, his pioneering conviction that the classic behavior of matter in bulk could be treated on an atomic and molecular scale was vital inspiration to many, including myself, in following up the studies of the electrical properties of matter and its chemical, physical, and mechanical manifestations. I had been led into this field by my teachers, first Smyth and then Debye, even before I was captivated just forty years ago this coming spring by macromolecules (polymers) as particularly large and convenient molecular handles on materials properties.

So you see, what an honor it is to have yet another association with Professor von Hippel, a legendary prophet in the realm of interdisciplinary science and technology.

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And now this gathering signifies an era of national and world activity in materials science and engineering. The Materials Research Society itself demonstrates part of what will rank in the history of this century with the epochs of nuclear energy, molecular biology, space exploration, and quantum electronics as principal features of our Age of Science and Technology. But his could have happened only because in addition to prophets there were champions. These champions undertook to create new generations of experts in materials, through their devoted teaching research in universities. Others of them generated technology what forms now the base for progress in the largest component and the fastest-growing part of the free world's economy--the creation and processing of information and communications.

In this regard, it is not coincidental that the first decade of such nationally structured and sponsored materials education/research/development was assessed in a notable conference at University Park, Pennsylvania, the 14th of April, 1969. This was sponsored by Professor Rustum Roy, who subsequently edited the proceedings entitled, "Materials Science and Engineering in the United States". Nor is it incidental that the great interdisciplinary laboratories sponsored by the National Program which began two decades ago this coming spring in the White House Science Office. This same program finds embodiment near this meeting at the Bush Laboratory at MIT. And indeed, at the formal dedication of the Penn State laboratory on the 13th of November 1969, Professor Roy encouraged us to report as the theme for the occasion on "Scientific Research and Humanistic Learning". So, here is one cause, one reason, to illustrate why Professor Morris Cohen and come others of us found in the major assessment of materials science and engineering by the National Academy of Sciences a couple of years ago, the COSMAT Report, that materials science and engineering had become one of the major areas of learning and of use of knowledge in the nation and the world.

But, we are not just enjoying some minutes of sentiment here in Boston in the last days of the turbulent and unsettling year of 1978. Rather, we are seeing in the program of this meeting, in its symposia on nuclear wastes and materials handling, on composites, on the structure and syntheses, on catalysts, and on laser processing of matter, a vivid and compelling vision of what the future can be. Now we must recommit our energies, in this 20th year of formal structure for materials science and engineering, to the next decades of progress and performance. After all, the past decades were not tranquil, either. Some of the difficulties are well stated in the fascinating diary of Professor G. B. Kistiakowsky, describing his experience as Special Assistant for Science and Technology for President Eisenhower (A Scientist at The White House, Harvard University Press, 1976, p. 14 and elsewhere). Indeed, his role was notable in achieving progress, carried on also under President Kennedy, in the formation of the National Materials Program, described as (l.c. p. 15):

"A federally-financed interdisciplineary program at non-profit institutions, the Materials Sciences Program, aimed at improving the quality of metallic, plastic, ceramic, etc., materials used by industry, was conceived in PSAC under the leadership of W. O. Baker (Bell Telephone Laboratories) and recommended by Dr. Killian to Mr. Staats and to the FCST." (Since this talk was given, this program in its present mode in the NSF appears to have sustained yet another challenge by more conventional, monodisciplinary advocates.)

Above all, we must assure the strength and independence of our universities where great gains were made in those actions of two decades ago, especially in the assignment of national resources. We must now strive for yet new levels of support for these most precious elements of civilization itself. We can and shall do this.

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The examples of the prophets and the champions represented here, and to which we have referred, proclaim that we must not and shall not slacken in this resolve.

Already new pathways are being traced for the oncoming growth of materials science and engineering. In chemistry, where reluctances have sometimes been encountered, we are invoking the issues of energy and raw materials, and their worldwide strictures--to activate new common programs.

Under the auspices of the International Union of Pure and Applied Chemistry, completely independent of any Government guidance, we assembled in Toronto last July the CHEMRAWN I Conference. The proceedings of this gathering, which brought together materials, especially biomaterials, experts and users from around the world, reflect a new conjunction of established fields such as chemistry, botany, biogenetics, and the geophysics of oil and coal with materials science and engineering.

The forthcoming International Materials Congress, to be sponsored by our Government agencies in Washington in March, under the auspices of the National Research Council, will similarly involve energy matters in close liaison with materials work.

But the program participation of this Materials Research Society annual meeting signifies the right theme as eloquently as one could ever hope. Indeed, this program is a dream come true for many of us who have long been convinced, as was von Hippel, that the understanding and utilization of matter are worthy of combining the skills that have been so properly refined in the early, distinct, disciplines of science. This idea seems to be illustrated in a variety of the most compelling concepts of our time. These range to the proposal of the chemist, Professor Harold Urey, that carbon formed in the birth of the planet is transported and reacted by pressures and temperatures into the stable gas, methane. This would mean that carbon, once presumably distributed rather uniformly throughout the earth's volume, was brought outward by reaction with hydrogen. Then, subsequent reactions over the eons of time have redistributed it and concentrated it in the surface of the earth. This new concept, of course, relieves concerns about how fossil oil and coal might first have been so curiously concentrated and deposited organically.

Indeed, starting from this intriguing view of earth, we think also of the organic materials evolution in the universe, so many remarkable molecules of which have been discovered in the recent work of Penzias and Wilson, now on their way to the festivities in Stockholm. And then we are seeing a cosmic joining of these ideas, through the studies of Walter Brown and his associates, about the presence of fine particles including carbon in outer space, on whose surfaces and within whose volumes remarkable reactions can occur. Altogether you are representing these matters with astonishing scope in this program. Even if Walter Brown himself is speaking on other things, he is here, as are Boudart, Eisenberger, and Sinfelt, and others, reporting new fine structure techniques, which peer more deeply and more precisely into the arrangements in matter than ever before possible. D. R. Hamann's elegant work on interaction of hydrogen with silicon, which we hope will be extended someday to solid carbon, is another fine example of how solid state science is opening new views of matter and its conversion. And then there is Professor Nicholas Bloembergen, a distinguished pioneer in the stimulated emission of radiation and in laser principles. So overall, and especially with your distinguished colleagues from overseas, you have made this gathering a memorable marker of new joining of knowledge and of goals for service to all of humankind.

I am honored to participate, and thank you again for sharing with me this happy occasion in the presence of Professor von Hippel.

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