MRS Medals Awarded to Huffman, Krätschmer for Fullerene Work

The 1993 MRS Medal Awards, which recognize distinguished recent innovative achievements or discoveries that are expected to have a major impact on the progress of any materials-related field, go to Donald R. Huffman, professor in the Department of Physics at the University of Arizona, and to Wolfgang Krätschmer, professor at the Max-Planck-Institut für Kernphysik for the discovery of a way to produce macroscopic quantities of fullerenes and for elucidating many of their physical and chemical properties.

Krätschmer and Huffman have performed sustained research in carbon structures, driven by their desire to explain the anomalous optical spectrum of carbon from outer space. This early research drew them together and ultimately led them to the dramatic discovery of a simple way to synthesize fullerenes. As early as 1982, they noted that a sample produced by resistive evaporation of graphite in a helium environment showed structure in the ultraviolet-visible spectrum near 250 nm. After learning of the proposed C_{60} molecule, they speculated that the absorption feature might have indicated the presence of C_{60}.

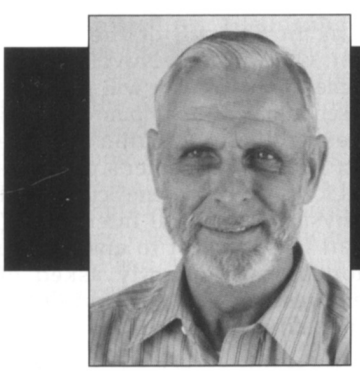
As reported in the September 27, 1990 issue of *Nature*, Krätschmer and Huffman, along with co-authors Lowell D. Lamb and K. Fostiropoulos, reported that fullerenes could be made in large quantities using an arc discharge produced between two carbon rods in an inert background gas at reduced pressure. This breakthrough made it possible for fullerene research to move from gas phase and theoretical studies to the full range of materials research.

Their work has been characterized by fullerene researchers as changing the face of carbon chemistry, physics, and materials science.

In addition to discovering that fullerenes existed in carbon soot produced by an arc discharge, they also reported how to grow crystals of fullerenes. They showed that fullerenes were soluble in benzene and that crystallites could be formed by evaporating the solvent from a fullerene-saturated solution. They also reported that fullerenes could be sublimed intact at temperatures of only a few hundred degrees Celsius, offering an alternate pathway for growth that eliminated the solvent, demonstrating how pure materials could be prepared for a wide range of thin film studies.

In the same *Nature* article, comprehensive characterization revealed that in solid form the molecules were spherically close-packed and that characteristic vibrational and electronic excitations, which were in accord with theoretical expectations, could be used for "fingerprint" identification of the molecule.

Huffman and Krätschmer not only provided a efficient route to producing fullerenes, but they inspired a band of materials researchers to invent a whole variety of increasingly efficient methods for fullerene production. With macroscopic quantities of fullerenes available, scientists and engineers worldwide set



Donald R. Hoffman

Wolfgang Krätschmer

https://doi.org/10.1017/S0883769400038586 Published online by Cambridge University Press

out to determine the fundamental properties of these materials and their potential applications. Broader availability of macroscopic quantities of fullerenes also spurred scientists from different disciplines to work together and broaden their own horizons in the process.

Donald R. Huffman earned his BS degree in physics from Texas A&M University, his MA degree in physics from Rice University, and his PhD degree in physics from the University of California, Riverside. After a National Science Foundation postdoctoral position at the University of Frankfurt, he joined the University of Arizona as professor of physics. In 1992 he received the title of Regents Professor of Physics. He was honored with a Senior U.S. Scientist Award from the Alexander von Humboldt Foundation to do research at the Max-Planck-Institute in Stuttgart and in Heidelberg in 1982. During this sabbatical year Huffman and long-time colleague Wolfgang Krätschmer began the work which led to their 1990 discovery of the process for high-yield fullerene production. The patent for the process was filed August 27, 1990.

Wolfgang Krätschmer earned his Diploma in physics from the Technische Universität Berlin. He completed a thesis at the Max-Planck-Institut für Kernphysik, Heidelberg, and earned his Doctorate in physics at the University of Heidelberg. In 1971 he joined the Max-Planck-Institut für Kernphysik in Heidelberg. Since 1983 he has been co-investigator in the development of a photospectrometer for the ESA project of an orbiting IR observatory (ISO). He was awarded the Stern-Gerlach-Preis in 1992 and the Leibniz-Preis DFG in 1993.

The Medals will be presented during the 1993 MRS Fall Meeting Awards Ceremony, Wednesday, December 1 at 6:00 p.m. in Salon E of the Boston Marriott. On Monday, November 29, Krätschmer and Huffman will give special presentations at 12:45 p.m. and 1:15 p.m., respectively, in Salon F of the Marriott Hotel. Kratschmer's presentation will focus on "Fullerene Science and Astrophysics: A Fruitful Interaction." Huffman will attempt to answer the question most frequently asked of fullerene researchers, "C_{60} and Other Fullerenes: What Are They Good For?"

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