

Exceptional Scientific Achievement Medal



J. Anthony Powell

In recognition of pioneering research, innovation, and exceptional personal commitment in the development of silicon carbide as an advanced semiconductor material.

Mr. Powell is an internationally recognized leader in silicon carbide (SiC) technology. Silicon carbide is gaining widespread recognition within NASA, DOD, and the aerospace community as a key semiconductor material, capable of filling the need for a major advance in high-temperature, high-power, and high-frequency solid state electronic devices. Because silicon carbide has so many potential applications in aerospace technology and other fields, Mr. Powell's pioneering research in this field may ultimately help the U.S. establish a multibillion dollar industry.

Currently a member of the Engine Sensor Technology Branch, Mr. Powell has led the Center's SiC research program since its inception in 1965. He has been heavily involved in every aspect of this

multifaceted technology area, including SiC crystal characterization and device fabrication. But he is best known for his pioneering work in thin film SiC crystal growth, which is the foundation for the future development of high-quality electronic devices.

In 1983, Mr. Powell's innovative research team successfully used chemical vapor deposition (CVD) to grow SiC on silicon semiconductor wafers. Research & Development Magazine recognized this achievement as one of the 100 most significant new products of that year. Since then, Mr. Powell's research team has provided more than 700 samples of this material to help more than 50 companies and institutions further their research. In 1987, Mr. Powell discovered crystal defects, known as inversion domain boundaries, which degrade the electrical properties of the crystals. To further study the crystal defects and develop methods for eliminating them, he established a strong collaborative effort with Case Western Reserve University and the University of Pittsburgh. In 1989, Mr. Powell wrote the first paper ever published on low-defect SiC grown by CVD on SiC wafers. This marks a major milestone toward the use of SiC to develop high-quality electronic devices.

Mr. Powell holds a first in device fabrication as well. He led the NASA team in fabricating a grown junction diode that demonstrated the best electrical characteristics ever reported above 400 °C.

During his tenure in this field, Mr. Powell has published more than 25 technical papers and received one patent. He has chaired numerous international conference sessions and is an active reviewer of SiC papers for two journals. In addition, he is a National Science Foundation proposal reviewer and a National Research Council research advisor. In 1989, he was a major contributor to the organization of an international SiC symposium—considered to be the most prestigious of this decade. In 1988, Westinghouse invited him to serve on the company's Silicon Carbide Steering Council, which is planning corporate strategies for using SiC technology.

Mr. Powell's creativity and drive in pursuing SiC technology have been major forces in NASA's SiC program and have been instrumental in furthering this technology on a global scale.
