

Surge Protection Hall of Fame



Dr. Michio Matsuoka

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Inventor of Zinc Oxide Varistor

In July of 1967, at the Matsushita Electric Co. in Osaka Japan, a young physicist named Michio Matsuoka and his team made a discovery that changed the surge protection world forever. The 30 year domination of SiC varistor technology was about to end. The Zinc Oxide based varistor as we know it today was born.

During the mid 1960's as the semiconductor industry produced lower and lower voltage devices, the need for better surge protection became a necessity. In 1965, at 29 years of age, Michio Matsuoka was assigned the task of finding the next generation of surge protection to meet the lower voltage requirements. A well thought out plan of attack was prepared with Zinc Oxide as the choice of ceramic material to be used. By March of 1967, the Zinc Oxide Varistor based on surface barrier properties had been developed and was ready for process optimization. In July of that year, during this process optimization, an oven being used to process the new surface barrier type ZnO varistor experienced a thermal-run-away. The resulting ZnO varistor had very different properties. After what had to be an exciting investigation, they discovered that Bi and Mn contained in the glass frit of the Ag paste had defused into the body of the ZnO and was responsible for these very different properties. This was the moment of discovery of today's Zinc Oxide Varistor.

This was just the beginning of the ZnO development that has lead to varistors lower than 5 volts and as high as 1.2 million volts.



Education

1960(March) Graduated from Osaka University Faculty of Science, Department of Physics.

1971 (November) Received the degree of Doctor of Science from Kyoto University. Thesis "Non-Ohmic Properties of Zinc Oxide Ceramics"

Career

1960-1996 Matsushita Electric Co.

Achievements

1967 (July) Discovered non-ohmic properties of ZnO Ceramics

1968 (December) Developed the ZnO varistor as an original inventor

500 Japanese Patents

40 papers on Varistors