

Production and performance study of Diamond-Like Carbon for the resistive electrode in MPGD application

Diamond-like Carbon (DLC), a newly recognized resistive material, is a kind of metastable amorphous carbon material. DLC has recently received considerable attention and is increasingly exploited in resistive electrodes to suppress discharges in Micro-Pattern Gaseous Detector (MPGD). DLC coating provided a new method to produce high-quality resistive electrodes for MPGDs owing to its low dielectric constant, wide band gap, good chemical and thermal stability. Many studies and optimizations on DLC production process is carried out with Magnetron Sputtering Technology to get applicable DLC resistive electrodes. Two different electrode structures (DLC/APICAL and Cu/DLC/APICAL) have been produced and tested in Micro-Resistive WELL (μ RWELL) detectors. The design, fabrication and test of a standard μ RWELL detector using DLC/APICAL structure were performed. A spatial resolution of better than 70 μ m in both dimensions was achieved while maintaining the detection efficiency higher than 95%. The rate capability (measured with 8 keV copper target X-rays) reaches 100 kHz/cm² when the gas gain is 8000. More studies to further improve rate capability with multi-point grounding method by using Cu covered DLC (Cu/DLC/APICAL) are also presented.

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Session Classification: Poster Session A

Track Classification: Gaseous Detectors