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The Phenomena of Abnormal Discharges in Pseduospark Switch

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Pseduospark switch, as a kind of low-pressure cold cathode gas switch, has broad application prospects and was studied for more than 30 years. Few researches reported the abnormal discharge in the switch which happened frequently in experiments. In our experiments, different from the hollow cathode discharge, three abnormal discharge modes, cathode sidewall to anode sidewall, cathode sidewall to anode hole and cathode plane to anode plane, were observed. The self breakdown of hollow cathode discharge only took a small proportion. Different voltage and pressure levels were tested and it was found that abnormal discharge occurred for several dozens of times and then disappeared which implied that they were irrelevant to applied voltage and gas pressure. These phenomena might be caused by the defects, salient and absorbed gas at the surface of electrodes which distorted the local electric field and were likely to emit electrons. What's more, asymmetric layout of electrodes may also lead to the abnormal discharge. All abnormal discharges developed along the relatively long path which was the characteristic feature of low pressure discharge and at the left side of Paschen curve. Therefore, when designing the switch, it shall be carefully noticed that concentration of electric field and long discharge path should be avoided.

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