

The Gas Discharge Tube with Isolated Power Connection

X. Liu, Q. Liang, Y. Liang

In this work, a gas discharge tube with isolated power connection was studied. Since the power connection is isolated, there is no current through the tube thus there is no power consumption. The gas inside the tube emits light, which can be absorbed by solar cells and be converted to power output. This device can be used as power generator.

A gas discharge tube emits light when high voltage power source is connected to the electrodes at the end of the tube. We found that the gas discharge tube also emits light when the high voltage DC power is connected to the tube surface. As shown in figure 1, the DC power is connected to two metal rings on the tube surface. The tube surface is isolated so that we call it as “isolated power connection”. There is low pressure gas inside the tube. The cosmic ray can ionize the gas molecule, and the ions can be accelerated by the electric field inside the tube. When ions obtain enough kinetic energy, they will strike other gas molecules and generate more ions. This process is avalanche. When the ionized molecules recombine with the electrons, they emit light. The emitted light can be absorbed by solar cells and be converted to output power. There is no current through the tube because the connection is isolated thus the consumed power from the power supplier is zero. The leakage current through the tube glass is negligible. The strength of light is determined by the gas pressure, power voltage, tube geometry, and type of gas.

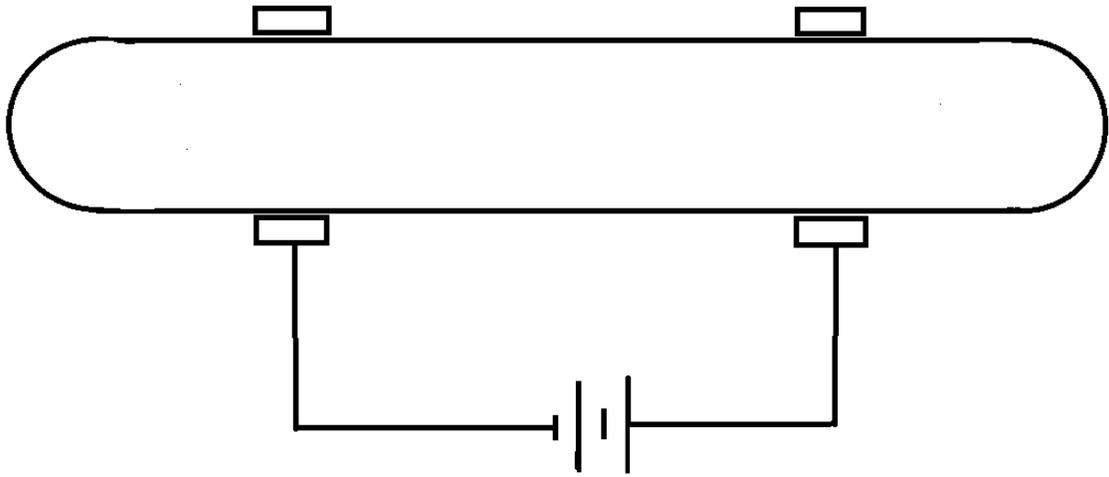


Figure 1: Schematic of the gas discharge tube with isolated power connection.