

LEEI-26 Apparatus of Work Function & Specific Charge of Electron

- Measure work function of metal
- Study V-I characteristics of diode
- Demonstrate principle of magnetron tube
- Measure specific charge of electron (e/m)





Electron energy distribution



This experimental apparatus is designed to study the work function of a metal based on the thermionic emission principle in a vacuum diode tube. In this method, the cathode metal is heated to a sufficiently high temperature to enable free electrons to escape from the metal surface. The number of electrons emitted depends upon the temperature. The higher the temperature, the greater the emission of electrons.

By placing an ideal diode tube in a magnetic field which is perpendicular to the electron field, the motion of electrons emitted from the cathode will be exerted by Lorentz force to form a spiral track. When the Lorentz force is strong enough, the electrons will not reach the anode, so no current is output from the diode. This way, the output of the diode is controlled by magnetization current. That is the principle of a magnetron tube. The charge-mass ratio (e/m), i.e. specific charge of electron, can be derived from parameters applied to the magnetron tube.

A lambda

Experimental Objectives

- 1. Understand the concept of thermionic electron emission and verify Schottky effect
- 2. Understand the concept of work function of a metal
- 3. Learn how to measure metal work function based on Richardson straight-line method
- 4. Understand magnetron principle and determine charge-mass ratio (e/m) by magnetron

Specifications

Ideal diode	pure Tungsten filament
	filament current 0.400 ~ 0.800 A, accuracy 1.0 mA
	anode voltage DC 0 ~120 V, accuracy 0.1 V
Coil parameters	inner radius <i>r</i> ₁ =24.0 mm
	outer radius r_2 =36.0 mm
	length L=18.0 mm
	number of turns <i>N</i> =800
Magnetization current	0 ~ 0.800 A

Part List

Main unit	1
Ideal diode	1
Diode housing	1
Magnetization coil	1
Wires	8
Manual	1



Circuit diagram for magnetron measurement

Note: above product information is subject to change without notice.

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