

## **JONSKI IZVORI**

### **I. HOLLOW ANODE ION-ELECTRON AND PLASMA SOURCES**

Ovi izvori se baziraju na novom tipu električnog gasnog pražnjenja u šupljoj anodi Hollow Anode Discharge - HAD /1/. Daljnja R&D ovog pražnjenja su dovela do nove generacije jonsko-elektronskih izvora i izvora plazme. Pokazalo se da su ovi izbori bolji od, na primer, poznatog Kaufmanovog izvora /8 /.

Više podataka o Hollow Anode Discharge u mojim radovima / CV/, i referencama:

1. V.Miljević, Spectroscopy of the Hollow-Anode Discharge, Appl..Optics, 23 (1984) 1598-1600.
2. V.Miljević, Hollow Anode Ion-Electron Source, Rev. Sci. Instrum., 55(1984) 931-933.
3. V.Miljević, Cylindrical Hollow Anode Discharge, J.Appl.Phys. 57 (1985)4482-4484.
4. V.Miljević, Hollow Anode Discharge with Axial Magnetic Field as an Electron Beam Source, J.Appl.. Phys. 63 (1988) 2237-2240.
5. V.Miljević, Some Characteristics of the Hollow-Anode Ion Source, Rev. Sci.Instrum. 63 (1992) 2619-2620.
6. V. Miljević, Cylindrical Hollow Anode Ion Source, Rev. Sci. Instrum., 73(2002)751.
7. V.Miljević, Large Area 4-cm dia Hollow Anode Ion Source, IV Europ. Conf. on Controlled Fusion and Plasma Heating, Dubrovnik 3 (1988) 1085-1088.
8. A. Anders, N. Newman, M. Rubin, M. Dickinson, E. Jones, P. Pathak and A. Gassmann, Hollow-anode plasma source for molecular beam epitaxy of gallium nitride, Rev. Sci. Instrum. 67.905(1996).

Patenti:

97. V.Miljević, Hollow-Anode Ion-Electron Source, US Pat. No 4, 471, 918 Oct. 3,(1989).
98. V.Miljević, Hollow-anode Optical Radiation source US Pat. No 4, 906,890, Mar. 6, (1990).
104. V. Miljević, Jonsko-elektronski izvor sa šupljom anodom, Jugoslovenski patent broj 46728, 16. jul 1998. godine .

## **II HOLLOW-CATHODE MAGNETRON ION SOURCE**

Magnetronski jonski izvori imaju jedan veliki nedostatak. Spektroskopska mistraživanja su pokazala da je u cilindričnoj magnetronskoj diodi maksimum jonske koncetacije u okolini katode. Međutim, u postojećim megnetronskim jonskim izvorima jonska struja se dobija kroz otvor u anodi, gde je jonska koncentracija minimalna. Zbog toga magnetronski jonski izvor radi sa velikom strujom pražnjenja u jakom magnetskom polju.

Ovaj problem je rešen pomoću novog tipa magnetronskog pražnjenja /1/ gde se ekstrakcija vrši iz šuplje magnetronske katode gde je jonska koncentracija najveća. Podaci o ovom jonskom izvoru mogu se naći u Handbook of Ion Sorces / 5 /, i u citiranim radovima:

1. V.Miljević, Hollow Cathode Magnetron Discharge, Phys. Lett. 92A (1982) 439-440.
2. V.Miljević, Hollow Cathode Magnetron Ion Source, Rev. Sci. Instrum., 55 (1984) 121-123.
3. V.Miljević, Hollow Cathode Magnetron Ion Source with Axial Extraction, Rev. Sci.Instrum. 67 (1996) 1224-1226.
- 4 V.Miljević, Hollow Cathode Magnetron Ion Source with Axial Extraction II, Rev. Sci. Instrum., 69 (1998) 1054-1055.
5. .... Handbook of Ion Sources, ....

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*Handbook of*

# ION SOURCES

*Edited by*

**Bernhard Wolf, Ph.D.**

GSI Center for Heavy Ion Research  
Darmstadt, Germany



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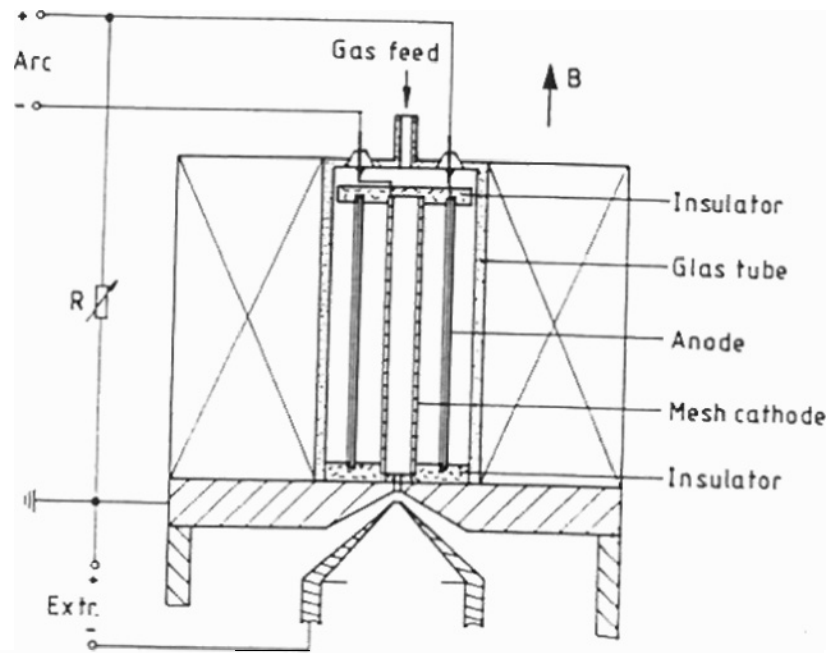


FIGURE 4.5  
Hollow-cathode magnetron ion source. (Courtesy of V. Miljević, VIVČA, Belgrade.)

Magnetron ion source with axial extraction.'

#### 4.3.2 Hollow-Cathode Magnetron (Figure 4.5)

- Special design and construction details of the source

The hollow-cathode magnetron consists of a diode with two coaxial cylinders placed in an axial magnetic field. A cylindrical anode is around the cylindrical mesh cathode and leaves a free optical axis through the ion source. Anode (18-mm  $O \times 60$  mm) and cathode (5.5-mm  $O \times 60$  mm) are insulated to the base flange with the extraction aperture in its center. The discharge plasma is established inside the hollow cathode. When the discharge is established and the base Range connected to the anode, an ion current is obtained even at low accelerating voltages.

- Ion source material and vacuum conditions

The discharge chamber is a glass tube (30-mm  $\varnothing$ ), the anode cylinder Al or stainless steel, the cathode mesh stainless steel wire (0.4-mm  $\varnothing$ ), eight lines per centimeter, and the insulators are made of lava. The base flange is nonmagnetic.

- Application area of the source

Accelerators, ion implantation, SIMS, ion beam analysis, optical spectroscopy

- Deliverer or user

V. Miljević, Institute of Nuclear Science VINČA Atomic Physics Lab., PO Box 522, 11001 Belgrade, Yugoslavia