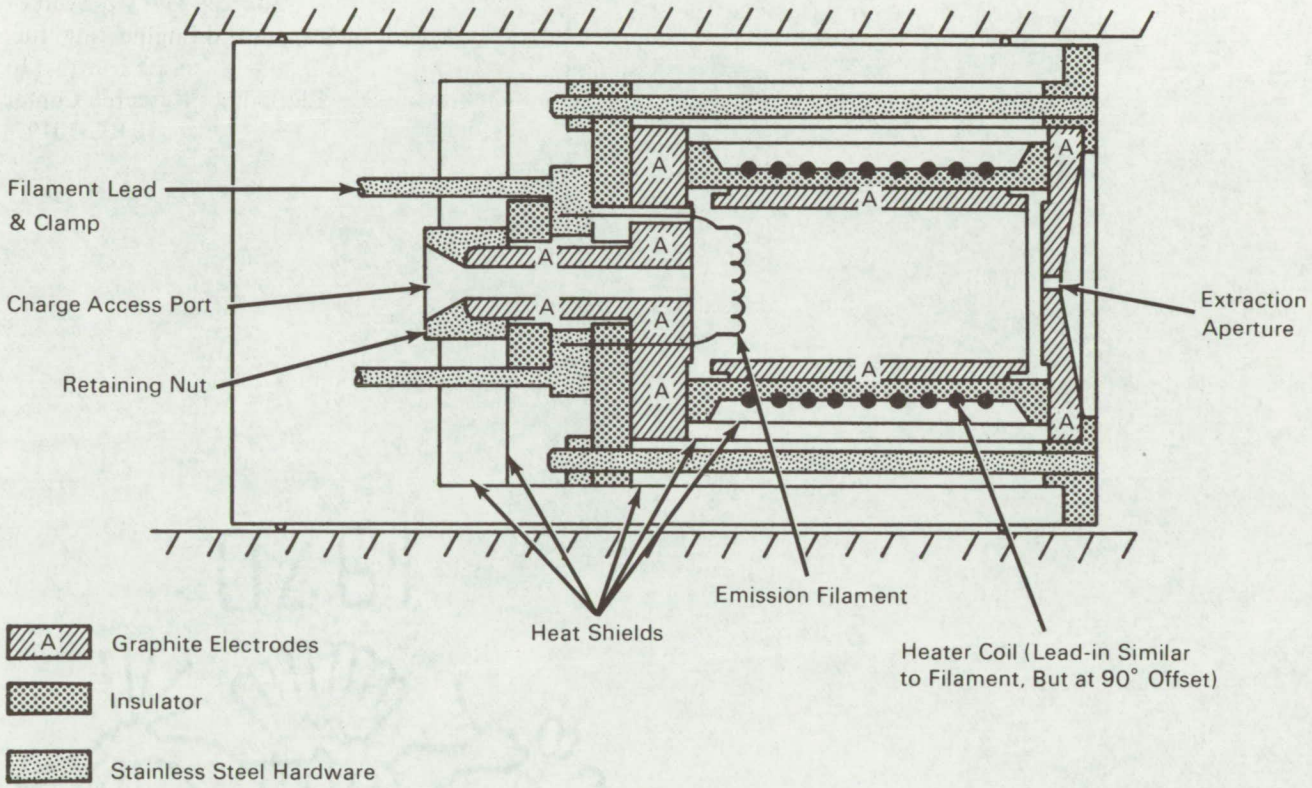
NASA TECH BRIEF

High Temperature Ion Source



A modified Nielsen-type ion source produces temperatures up to 1500°C and permits obtaining a plasma from low vapor-pressure materials. Changes in structural materials, heating arrangement, and radiation shields permit reaching these higher operating temperatures. The design minimizes thermal stresses, and all parts subjected to a severe temperature environment are of high temperature materials: grade HP boron-nitride insulators, graphite electrodes, tungsten or molybdenum filaments, and molybdenum radiation shields. A dual-filament discharge chamber achieves the high temperature and provides independent control of the heating and electron emission functions.

In operation, charge material is inserted in solid form, leaked in as a gas, or retained in a boron-nitride or graphite crucible. The external heater controls the temperature, while electron emission from the small

(continued overleaf)

central filament initiates and sustains the plasma. Four cylindrical heat shields and a disk substantially reduce the power required to heat the source. To produce an iron plasma requires a total power input of 300 watts, of which 100 watts are supplied to the emission filament.

Notes:

1. The ion source has been developed for use with apparatus for investigating the optical radiation produced by certain ion-neutral interactions in the energy range from 10 to 2000 eV. It may be of interest to personnel engaged in research in the chemical or petroleum industries, and to manufacturers of scientific and analytic instruments.
2. The following documentation may be obtained from:

   Clearinghouse for Federal Scientific
   and Technical Information
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.65)

   Reference:
   NASA-CR-86022 (N68-28774), Design, Development and Experimental Verification of Atomic Beam Apparatus

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Dr. R. Swift of
American Science and Engineering, Inc.
under contract to
Electronics Research Center
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