ION IMPLANTATION SYSTEM FOR HIGH ENERGY BEAMS

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1. General Instructions

Ion implantation is now standardized and established in silicon semiconductor production lines. Recently the ion implantation method has come to be applied to the researches of compound semiconductor such as GaAs. To satisfy their requirments, we developed an ion implanter which, for wide application, has high energy and medium beam current, and can produce various ion species. In the following, we describe its specification.

2. Specification

(1) Energy range 10 – 400 KeV continuously

(2) Ion species and Beam current

(a) Maximum beam current

ION	SPECIES	TARGET CURRENT
B-11	BCl_3 (Gas)	280μA
Si-28	SiO (Solid)	40μA
P-31	P (Solid)	200μA
Ar-40	Ar (Gas)	500μA
As-75	As (Solid)	500μA
Se-80	Se (Solid)	220μA
Cd-114	Cd (Solid)	30μA
Te-130	Te (Solid)	178μA
Xe-132	Xe (Gas)	7μA

(b) Minimum beam current 100nA

(3) Vaperizer for solid material : 1200°C max

refer to structure of ion source Fig.1 and Fig.2

(4) Ion mass range : up to 140AMU (3.5 AMU Mev analizer)

(5) Ion mass resolution : $M/\Delta M=130$ where ΔM is the full width of half height.

refer to mass spectrum of Cd Fig.3

(6) Stability of ion beam

10% of maximum ion beam / 2 hours

5% of minimum ion beam / 20 minutes

(7) Wafer temperature range : −180°C ~ +800°C

(8) Vacuum system

full auto system from start to end

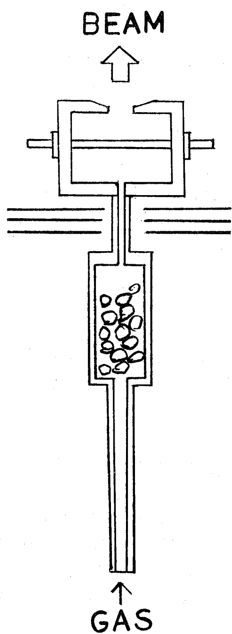

Fig. 1. Middle temperature oven ion source

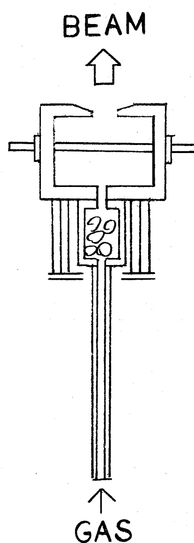

Fig. 2. High temperature oven ion source

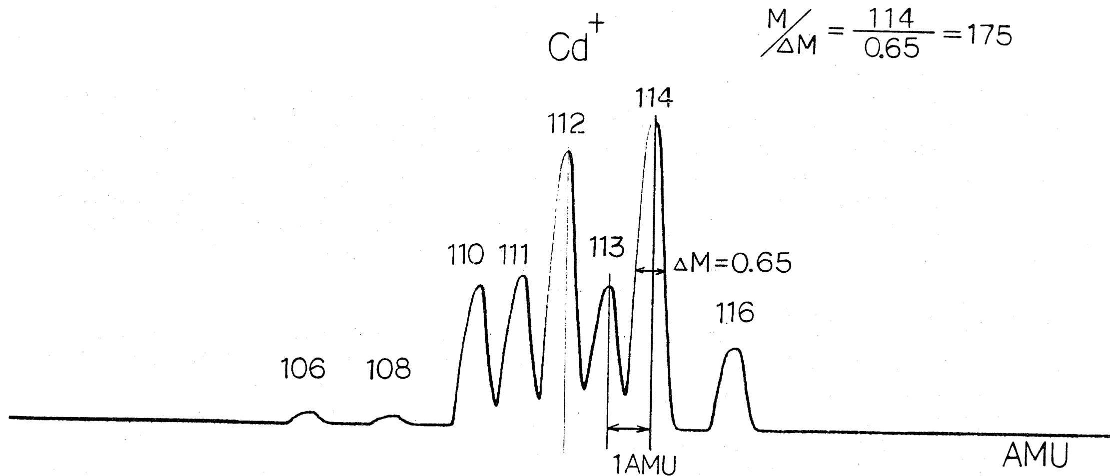

Fig. 3. Mass spectrum of Cd. (solid)
beam current Cd-114 : 30 μA