Progress Report
00001AA

Title of the Project:

Epitaxial Growth of Diamond Films Using Low Energy C^- Ion Beam Surface Modification.

Topic Number: BMDO94T002
Contract Number: N00014-95-C-0081
Contract Starting Date: January 13, 1995
Contract Ending Date: July 12, 1995

Distributed To:

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Prepared By:
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SKION Corporation
612 River St. Hoboken NJ 07030

Report Date: 2/12/95

Proposes Performance Plan

1. Construct the C^- ion source and MW plasma CVD system. [1-2 months]
2. Investigate the epitaxial growth processing technology by controlling the surface modification process and produce PE CVD. [3-5 months]
3. Characterize the optical and structural properties of the typical samples. [4-6 months]
4. Refine deposition process design [6 months]
5. Final report [6 months]

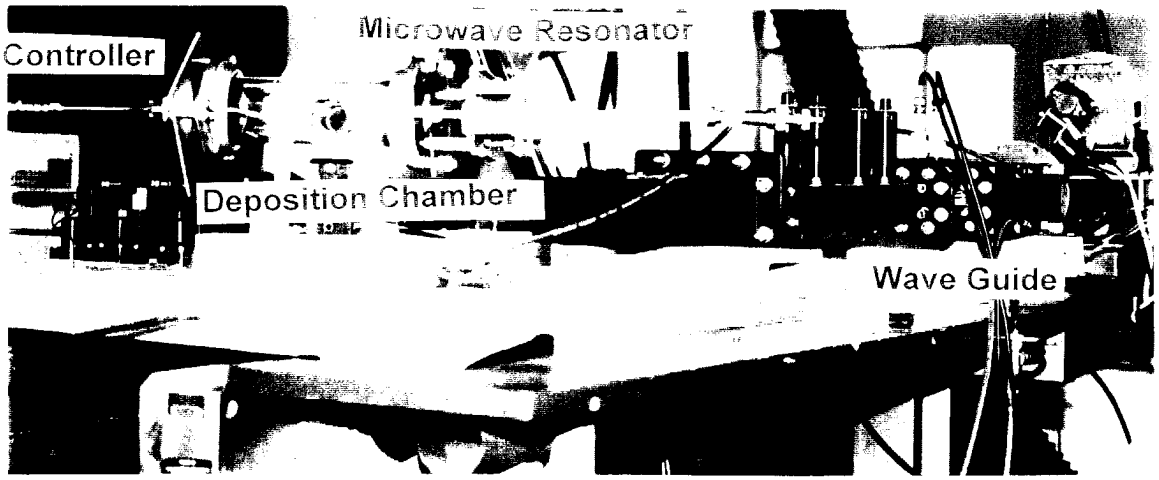
According to the above proposed performance plan, we were constructing the deposition system and C^- ion source in a previous month. The proposed work will be performed in two independent systems: (1) obtain C^- ion beam parameters for the optimum surface configuration for epitaxial diamond nucleation in LEED installed UHV chamber, (2) epitaxial growth studies in ion beam CVD system where C^- ion gun will pre-treat the sample surface according to the parameters obtained in UHV system and further growth will be performed by Microwave Plasma Enhanced CVD (MWPE CVD) process.

The Fig.1,a shows the photography of MWPE CVD deposition system where we will grow the films. Previously, we had deposited carbon nitride films using co-deposition of C^- ion gun and nitrogen plasma introduced by MW plasma source shown in Fig.1,a. Since the first task is to find the condition for the surface modification by C^- ion gun, we are modifying the existing C^- ion gun to be fit in UHV analysis chamber as shown in Fig.1,b. We are also constructing a new UHV C^- ion gun which will be dedicated to the UHV analysis chamber. In the mean time, we will investigate the surface modification using the modified C^- ion gun which was attached to the CVD deposition chamber. As soon as we complete the construction of the UHV C^- ion gun and also by this time we will have some information on the surface modification parameters, we will attach the C^- ion gun back to the CVD system and we will investigate the epitaxial growth. The newly built UHV C^- ion gun will then be installed to the UHV analysis system, we will further investigate the surface modification.

Summary of activities in the first month (1/13/95 - 2/12/95)

- LEED was installed in UHV analysis system (Fig.1,b)
- The existing C^- ion gun was modified to fit into the UHV system. (mechanical drawing of the modification parts and schematic diagram of UHV system is attached in Fig.2)
- The necessary modification parts are machined. (invoice attached)
- The construction of the UHV C^- ion gun is in progress: necessary parts are ordered (invoice attached) and the schematic drawing of the UHV C^- ion source is shown in Fig.3.

a



b

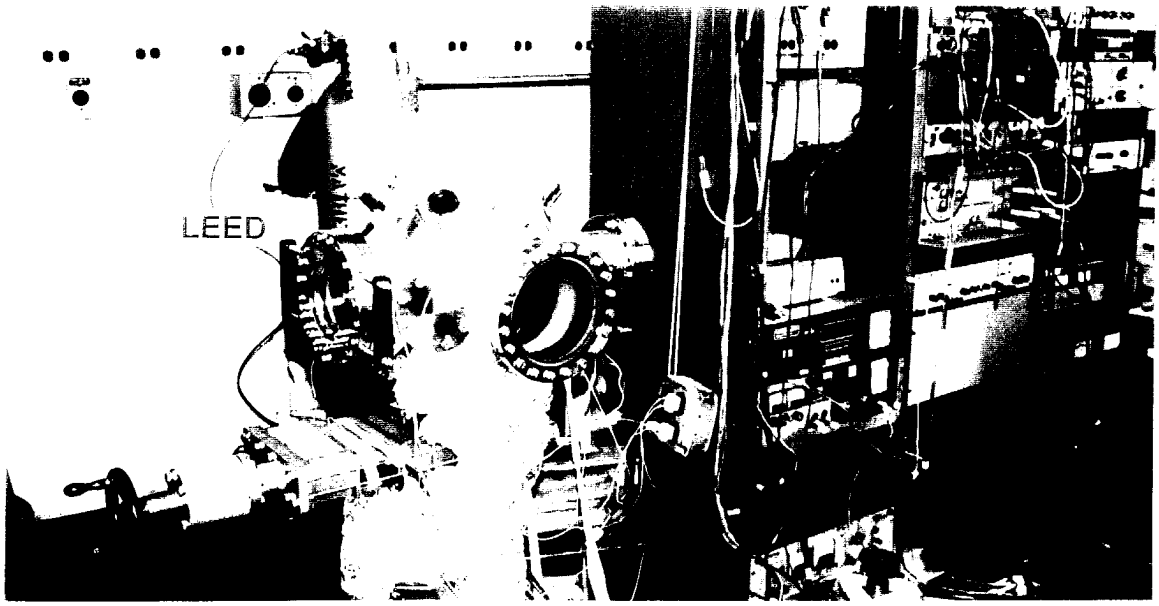


Fig.1 Photograph of Microwave Plasma Enhanced (MWPE) CVD system a) UHV analysis system b)

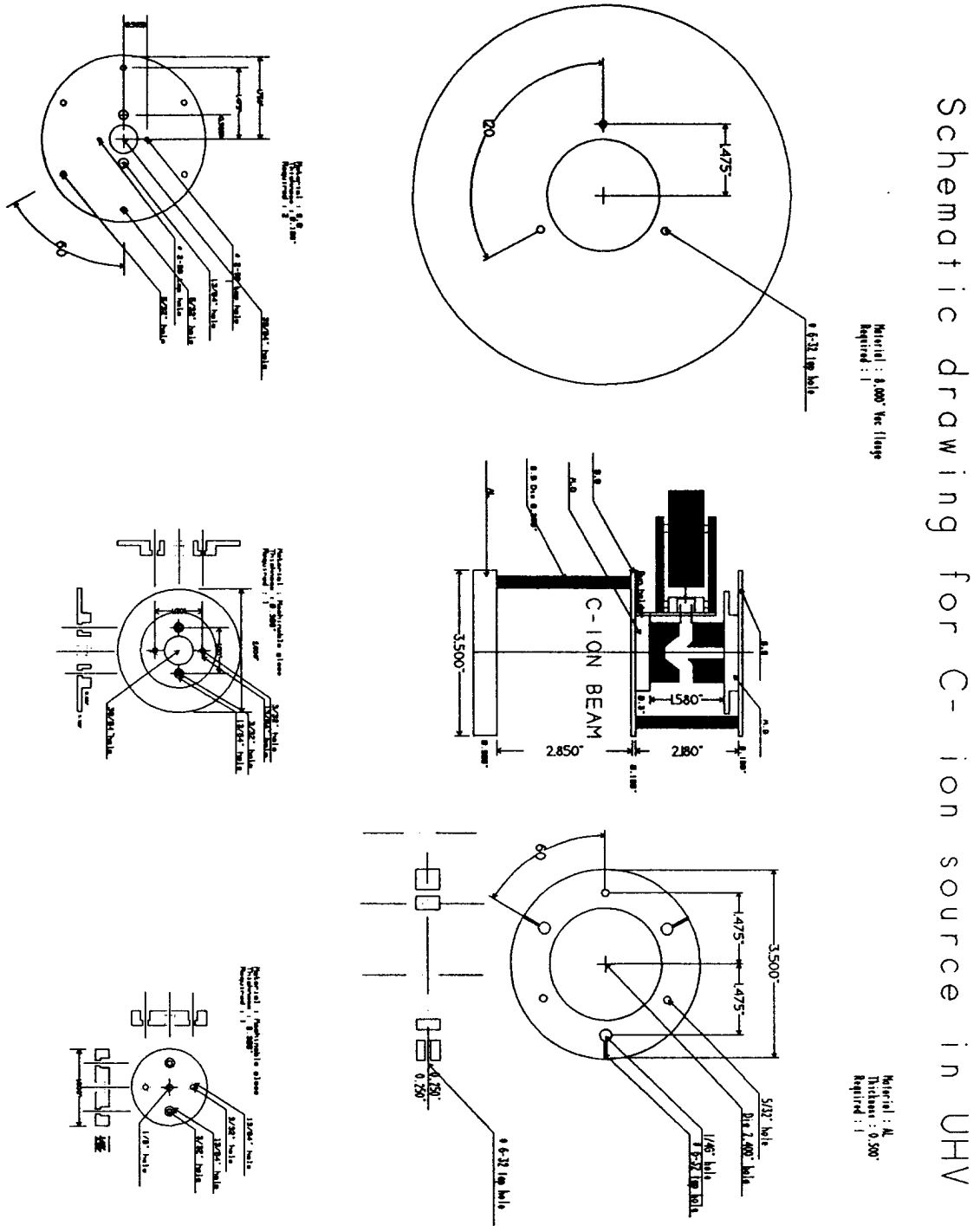


Fig.2 (a) Parts for the modification of C- ion source.

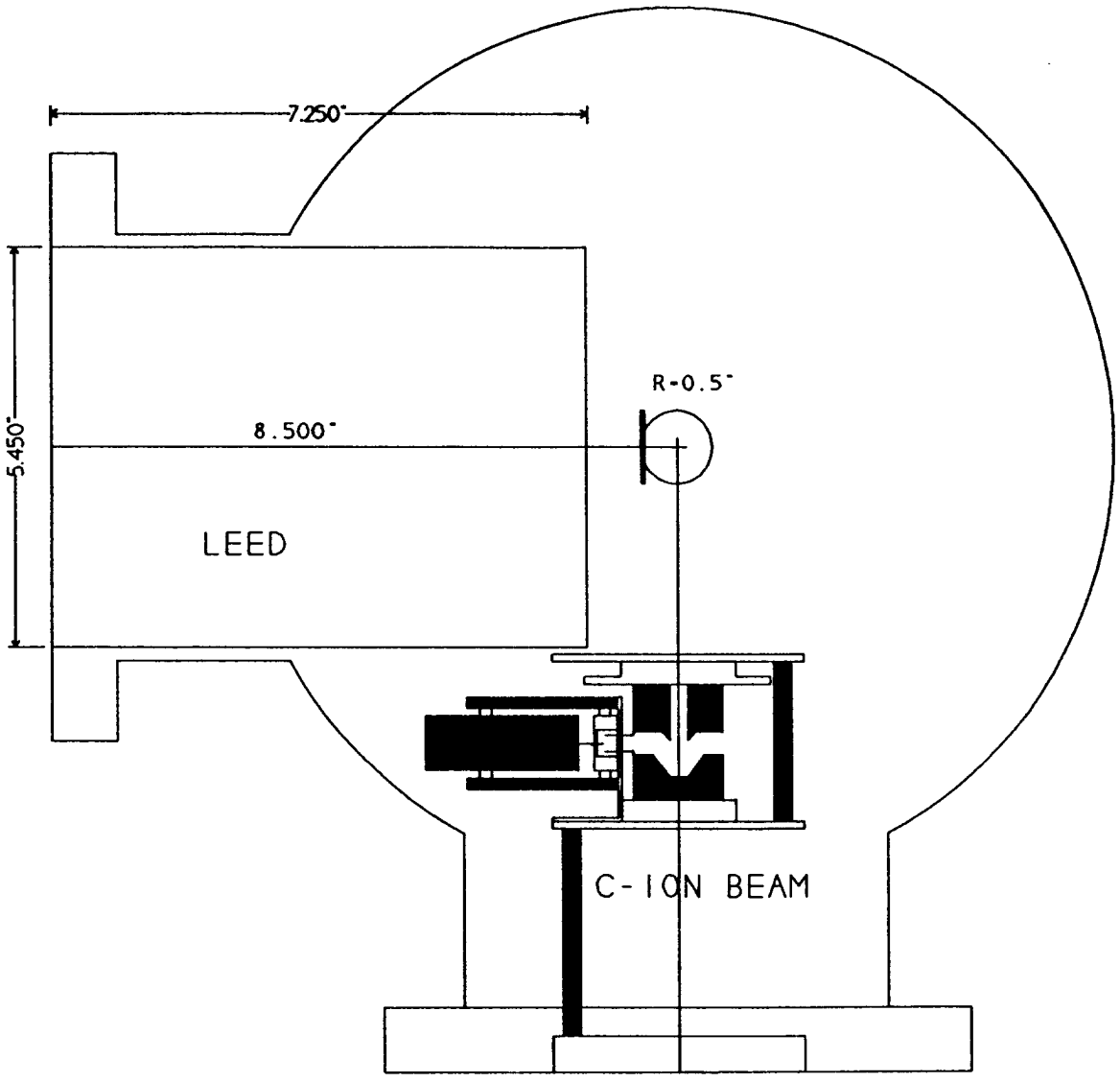


Fig.2 (b) Schematic drawing of UHV analysis chamber.

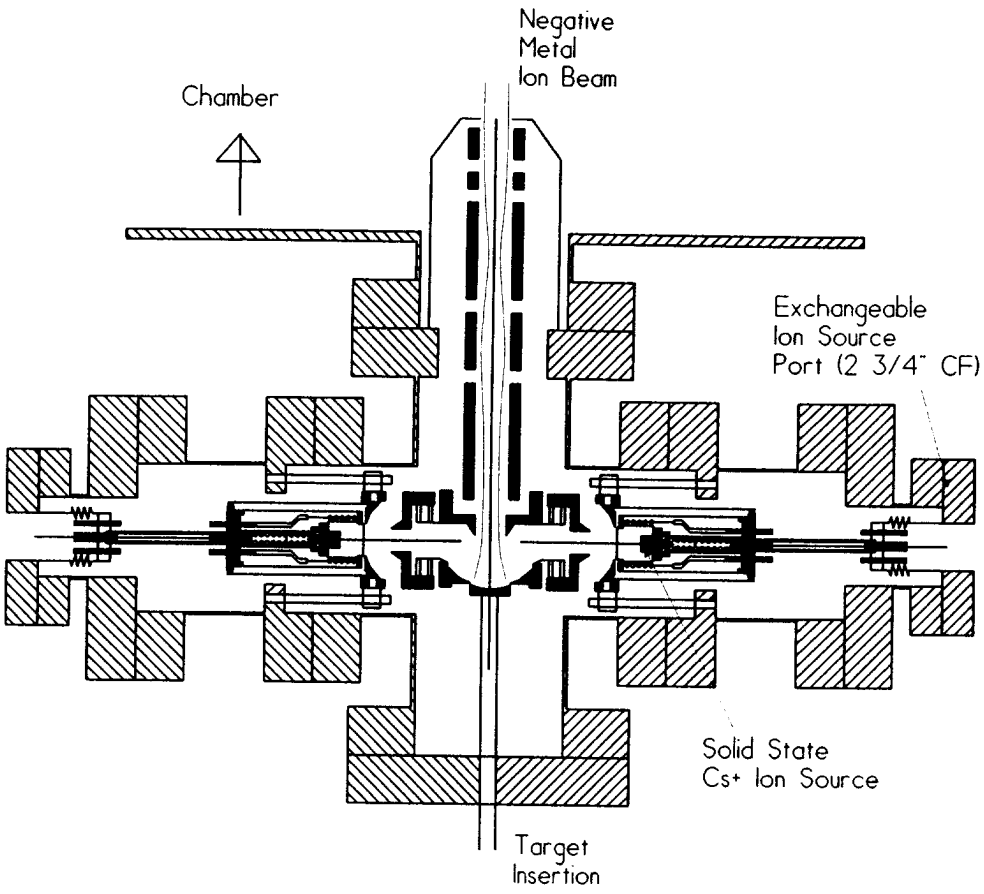


Fig.3 Schematic presentation of the SKION's NMIBS which will be constructed and used in UHV analysis chamber.

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Mountainside, NJ 07092
(908)654-9327

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INV. #: I0123-G1
Ref. #: PO# P1951J-01

Net: 30 Day

BILL TO:
SKION Corp.
612 River St.
Hoboken, NJ 07030

SHIP TO:
SKION Corp.
612 River St.
Hoboken, NJ 07030

ITEM	#ORD.	#SHPD	B/O	DESCRIPTION	UNIT PRICE	TOTAL
1	1	1	0	6C-250 6 way cross 4.5"CF	$775.00	$775.00
2	1	1	0	ZV-250 4.5"CF Viewport	$220.00	$220.00
3	1	1	0	3TR-250-075 Reducing Tee	$260.00	$260.00
4	2	2	0	2NR-450-275	$155.00	$310.00

SUB TOTAL	$1,565.00
TAX	
FREIGHT	$19.93
TOTAL	$1,584.93

ORDER Partial/Complete

THANK YOU FOR YOUR ORDER

INVOICE

GENERAL MACHINING
228 Front St. Secaucus NJ 07094
Tel 201-216-5265
Fax 201-216-5638

TO	Dr. S.I. Kim SKION Corporation 612 River St. Hoboken, NJ 07030 201-216-5633

Date	2/7/95
Invoice No.	020795-001
Contact	Mr. Ko

No.	Description	Qty.	hour	Rate	Total Price
1	Aluminum plate	1	4	$20	$80
2	S.S. plate	2	12	$20	$240
3	Boron Nitride plate	1	8	$20	$160
4	Machinable ceramic plate	1	12	$20	$240
	TOTAL		36		$720

The above items are machined and delivered to SKION on 1/31/95.
Please pay the above amount as soon as possible.

General Machining 228 Front St. Secaucus, NJ 07094 Tel 201-216-5265 Fax 201-216-5638	George Wohlrab, President George Wohlrab Date: 2-7-95

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2. The Defense Technical Information Center received the enclosed report (referenced below) which is not marked in accordance with the above reference.

PROGRESS REPORT
N00014-95-C-0081
TITLE: EPITAXIAL GROWTH OF DIAMOND FILMS USING LOW ENERGY C-ION BEAM SURFACE MODIFICATION

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