

Specifications for a Hydrogen Bromide Inductively Coupled Plasma Reactive Ion Etcher System (ICP RIE)

1.10 Scope. This specification describes the minimum technical requirements and the minimum acceptable performance standards for a hydrogen bromide (HBr) Inductively Coupled Plasma Reactive Ion Etching (HBr ICP - RIE) System to be installed by the contractor at the Naval Research Laboratory (NRL), Washington, DC. The HBr ICP - RIE system must provide ease of operation and safety to user.

1.20 Installation Site. The system will be installed at the Naval Research Laboratory, Washington DC 20375.

1.30 Description and Primary System Components. The tool must meet the specifications as indicated in the process specifications section of this document. The system is intended for use by multiple users within that site. Therefore, it must be computer controlled via menu-driven software and be user friendly. The system must be clean room compatible (clean room class 100).

2.00 Required System Features:

- 2.01 Universal base console housing the electronic sub systems, control units, pneumatics, and turbomolecular pump.
- 2.02 Operating system providing a Windows XP™-based environment for operator interface of process control, wafer handling, real time data logging of process parameters, machine status and recipe management. System must provide a user logon requirement.
- 2.03 ICP process chamber which must be equipped as follows:
 - a pumping port with dia. of 100 mm.
 - electrical heating cartridges for heating all process chamber walls to reduce condensation of process effluents
 - view port and end-point-detection ports for optical emission and laser interferometer
- 2.04 The system must be capable of operation while the wafer is being cryo (LN₂) cooled or while the wafer is heated (temperature range -150°C to +400°C).
- 2.05 System must have a remote high-density plasma source of at least a 65 mm inside diameter with the following features:
 - a maximum output of no less than 600W RF power @13.56MHz.
 - an automatic matching unit that is close-coupled to the source.
 - the source is to use an electrostatic shield to produce a purely inductive plasma

- 2.06 Substrate bias to be provided by an independent RF generator, with a minimum of 600W, connected to the lower electrode through a close-coupled automatic matching unit.
- 2.07 A 100-millitorr (mT), temperature-stabilized capacitance manometer with isolation valve must be provided for process control. An active penning gauge is to be provided for base pressure measurement.
- 2.08 The pumping port is to be fitted with a variable gate valve for chamber isolation and automatic process pressure control. An electrical heating jacket must be provided for the pump-down pipe to reduce condensation of process effluents.
- 2.09 System must have stainless steel gas pods that provide a minimum total of 8, independently controlled, mass-flow-controlled process gas lines, four of which must be capable of handling toxic and corrosive, or explosive, gases. All toxic and corrosive process gas lines must be double walled and use metal-sealed mass flow controllers (MFC's). The four gas lines that are both non-corrosive and non-toxic may use elastomer sealed MFC's. Each line must be provided with a mass-flow-controller for the accurate control of gas flows.
- 2.10 System must include load lock chamber for vacuum loading of a single 3" or 4" wafer into the process chamber. The load lock is to be provided with its own turbo and rotary pump set.
- 2.11 Process and base-pressure pumping must be accomplished by a magnetically levitated turbo pump with a minimum pumping capacity of 1300 l/s. A backing pump is optional.
- 2.12 The system must have a plasma cleaning recipe in order to maintain chamber cleanliness and process reproducibility. The used cleanings gases need to be SF₆ and O₂.

3.00 Optional Items:

The following items must be offered as options and must be field retrofittable to the tool.

- 3.01 Quartz wafer clamp with integrated sputter guard.
- 3.02 Increase the number of Mass flow Controllers (MFC) to 12 MFCs. This must include the space within the existing gas cabinet and the gas line connections at the system.
- 3.03 A backing pump with filter and Fomblin oil is optional.
- 3.04 On-site process demo after hardware installation.

4.00 Documentation:

- 4.01 The contractor must provide all documentation, drawings and schematics necessary for full operation, troubleshooting, servicing and repair of the system and its components
- 4.02 The System must be shipped with one (1) complete set of operation and maintenance manuals printed on cleanroom paper and an electronic version on CD-ROM.

5.0 Acceptance Criteria:

- 5.01 The contractor must demonstrate the system is fully operational after installation of the system at the NRL. This should be done by running an etching process on a II-VI semiconductor.

6.00 Installation and Commissioning:

6.01 For installation and commissioning the following steps are to be carried out:

- It is recommended that the Offeror visit the installation site. After delivery, the Contractor support engineer will unpack the system, inventory its contents and ensure that all packages have been received, advise on the placement of the system in its final location and prepare it for installation.
- Government will be responsible for attaching the system to the building site utilities. The contractor will be responsible for advising the government of all of the utilities needed for the proper installation.
- Contractor support engineer will assist the Government in the verification of the installation and facilities readiness and power up the system and verify that all hardware and software are functioning properly according to the equipment manufacturer's original specifications.
- Contractor applications engineer will assist the Government in the complete verification of system and process performance.

7.00 Warranty:

7.01 All equipment shall be warranted in accordance with standard commercial practices. The warranty shall begin after acceptance of the system.

8.00 Fully Functional, Fully Operation System

8.1 The Contractor shall provide a fully operational, fully functional, and fully-integrated system.

8.2 For the purpose of this solicitation, a fully operational, fully functional, fully integrated system is defined as a family of sub-elements (materials, parts, assemblies and subassemblies, components and subcomponents, hardware, software, firmware, etc.,) which, when assembled, form an integrated complex whole that is structured so that (a) its constituent parts perform in a functionally and operationally compatible manner; and (b) the system performs in accordance with the requirements stated herein.

CONTRACT DATA REQUIREMENTS LIST
(2 Data Items)

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 220 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Service and Communications Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please do not return your form to the above organization. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

A. CONTRACT LINE ITEM NO. 0002	B. EXHIBIT A	C. CATEGORY: TDP _____ TM _____ OTHER _____
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D. SYSTEM/ITEM	E. CONTRACT/PR NO. N00173-08-R-RS03	F. CONTRACTOR (To Be Provided At Award)
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1. DATA ITEM NO. A001	2. TITLE OF DATA ITEM System and Component Service and Repair Documentation	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE Contract CLIN 0001	6. REQUIRING OFFICE (To Be Provided At Award)
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7. DD 250 REQ LT	9. DIST STATEMENT REQUIRED	10. FREQUENCY OTIME	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION		
8. APP CODE		11. AS OF DATE SEE BLK 16	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	b. COPIES	
					Draft	Final Reg Repro

16. REMARKS The Contractor shall provide all documentation, drawings and schematics necessary for full operation, troubleshooting, servicing and repair of the required system and its components. Delivery of the required documentation shall be concurrent with delivery of the required system.	15. TOTAL → 0 1 0
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1. DATA ITEM NO. A002	2. TITLE OF DATA ITEM Operation and Maintenance Manuals	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE CLIN 0002	6. REQUIRING OFFICE (To Be Provided at Award)
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7. DD 250 REQ LT	9. DIST STATEMENT REQUIRED	10. FREQUENCY OTIME	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION		
8. APP CODE		11. AS OF DATE SEE BLK. 16	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	b. COPIES	
					Draft	Final Reg Repro

16. REMARKS The Contractor shall complete operation and maintenance manuals in both of the following formats: (a) hardcopy of the manuals printed on cleanroom paper; and (b) an electronic copy of CD-ROM. Delivery of the required documentation shall be concurrent with delivery of the required system.	15. TOTAL → 0 1 0
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G. PREPARED BY RICHARD D. SEWELL	H. DATE 29 MAR 2008	I. APPROVED BY	J. DATE
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17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

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