PREBID CLARIFICATION

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Refer I-HUB QTF's GeM tender no. GEM/2023/B/3724947 dated 05/08/2023 with file reference no. I-HUBQTF/PUR/23-24/010 for the procurement of Inductively Coupled Plasma-Reactive Ion Etching (ICP-RIE). The Pre-Bid meeting was held on 16/08/2023.

At the outset, the Technical Committee welcomed all the Members and the Representatives of Prospective Bidders and briefed in general the scope of the tender and thereafter briefed the bidders on the salient features of the tender.

The representatives present were satisfied with the replies given and it was informed that the corrections / additions / clarifications given, as discussed during the Pre-Bid Conference would be hosted on the website of I-HUB QTF, IISER Pune and all the Prospective Bidders are required to take cognizance of the proceedings of the Pre-Bid Conference before submitting their bids as stipulated in the Bidding Documents. Attached are the detailed technical and commercial queries with their clarifications (Annexure I).

The other terms & conditions of the notice issued on GeM and on I-HUB QTF's website (quantech.org.in) will remain unchanged. No more correspondence in this regard will be entertained. The meeting ended with a vote of thanks.

Sd/-

Project Director / Chief Executive Officer

TECHNICAL AND COMMERCIAL QUERIES AND CLARIFICATION – ANNEXURE I

Tendered Sr. No.	Query / Clarification Sought	Clarification / Amendment
1	In the *"**Process Chamber Design and Construction**"* section, it is requested to add the following specification: *"Chamber should be electrically heated to 60 Deg C".*	Tendered specification prevails.
2	The parameter of ***"ICP Power"*** to be revised to: *"≥ 2KW".*	Tendered specification prevails.
5	In the *"**Vacuum**"* section, it is requested to add the following specification: *"Chamber pump down pipe work should be electrically heated to 80 Deg C".*	Tendered specification prevails.
6	In the *"**Gas Box**"* section, it is requested to amend the specification as follows: *"C4F8 and BCl3 MFC's must be electrically heated to 60 Deg C".*	Tendered specification prevails.
-	It is requested to add specifications to cover the utilities' part for gasses and safety system.	Tendered specification prevails.
8	In the *"**Wafer Section**"* section, it is requested to amend the specification for a single chiller covering a temperature range of -150°C to +80°C.	Tendered specification is amended *from* *"Suitable heating and cooling arrangement should be provided to achieve electrode temperature of -150°C to +80°C with LN2 cooling, suitable chiller to work in the temperature range of – 10°C to 80°C should also be provided".* to "*Suitable heating and cooling arrangement should be provided to achieve electrode temperature of -150°C to +80°C with LN2 cooling or suitable chiller unit*".
12	It is requested to share the detail process parameters for system acceptance.	*The process parameters to be achieved is added to the Tendered specification. (Annexure II attached)*
-	It is requested to clarify *"the capacity of gas cylinders."*	"*The cylinder size for SF6, C4F8/CF4, CHF3, He, Ar, O2, are 7 m^3 or more. For HBr, Cl2, BCl3 it is 0.5 kg or more."*
-	It is requested to clarify *"the distance between installation place of the system and the gas box."*	*"Not confirmed yet."*
6	-	In the *"**Gas Box**"* section, it is decided to add the specification as follows: *"e. The system should work as a standalone complete set without any additional component."*

ANNEXURE II

Process Parameters to be achieved

The process parameters to be achieved should be better than what are given in the table below. This will be considered as the acceptance criteria.

Process demo:

The system is going to be extensively used for etching of Silicon (Si), Quartz /Fused Silica, SiNx, and SiO_2.

The demo process of etching on samples provided from IISER Pune (details of the required etch test mentioned below) should be carried out to develop the process. The process recipe needs to be replicated by the installation engineers on a similar set of samples after the installation of the machine is completed at the IISER Pune site.

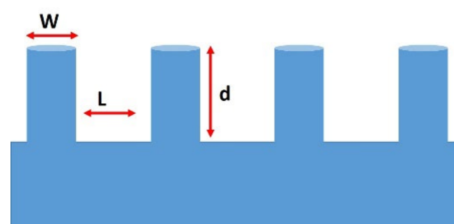
Vendor should provide measurement results of factory etch profiles, like SEM images (cross-sectional), AFM results and profilometry step height and it should later match with onsite etch and measurement profiles, using IISER Pune's inhouse SEM, AFM, and profilometer for side wall angle, roughness, and etch rate parameters.

Etch test: General (Si etching with Chlorine and Fluorine chemistry)

a) Side wall angle 90±5 degrees
b) Chuck thermal uniformity at 60 deg C <3%
c) Etch rate uniformity: For 20-2000 nm /min better than 5%

Etch test -1

Nano-pillar on Silicon (as shown in the adjacent schematic): Pattern with Al2O3, SiO2, Al, mask will be supplied by IISER Pune.



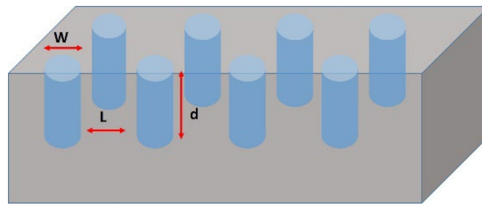
Parameter to achieve

1. Min/Max for W = 20-500nm, L=30nm-1000 nm, d= 500nm-10 um
2. Pillar side wall 86-90 degree

3. W/d (aspect) ratio = 1:50 or better
4. RMS roughness for the flat area <3 nm
5. Max. allowed std. deviation <5%

Etch test -2

Array of nano-hole on Silicon/SiNx (as shown in the adjacent schematic): Pattern with Al2O3, SiO2, Al, mask will be supplied by IISER Pune.



Parameter to achieve

1. Min/Max for W = 20 nm- 3 um, L= 30nm- 5 um, d= 400nm-10 um
2. Hole inner wall should be vertical (within 86-90 degree)
3. W/d W/d (aspect) ratio = 1:20 or better
4. RMS roughness for the flat area <5 nm

Same structure on SiO_2 needs to be etched to achieve the following parameter

Parameter to achieve

1. Min/Max for W = 200 nm- 2um, L= 300nm- 3um, d= 200nm-500 nm
2. Side wall angle 90±5 degrees
3. W/d W/d (aspect) ratio = 1:10 or better
4. RMS roughness for the flat area <5 nm