Bulk production of cyclo organopentasilane for deposition of Silicon thin films

The amorphous silicon and crystalline silicon thin films are used for electronic applications such as LED, solar panels, TFT, sensors, display devices etc. Conventional processes use organometallic precursors such as Si, SiC, GaAs, GaP, AIN, CdSe, CdHgTe, CuGaInSe to prepare electronic thin films. The present research is related to non-pyrophoric and non-corrosive precursors cyclic organopentasilane precursors used in bulk quantity for electronic applications and the process for preparing the same. These processes require highly sophisticated instrumentation facility like CVI, CVD or laser ablation etc. Out of these the Si thin films have attracted most of the users due to their longer life and comparatively easy availability of raw materials. For such applications SiH_4 and $SiCl_4$ are most commonly used precursor materials.Due to pyrophoric nature of silanes, handling and processing of these materials required high degree of manipulation skills and highly sophisticated processing devices which restrict easy commercialization of the products and technology.

The hygroscopic and corrosive nature of $SiCl_4$ also restrict its applications and due to generation of HCl, the Si thin films could not be grown beyond the certain thickness thus further limiting its applications. So continuously attempts are going on to use oligomeric / polymeric Si materials for deposition of Si thin films. Recently pentasilane has shown very promising results as LED materials. But the synthetic processes of these materials are also very cumbersome though safer to handle.

Further, the CVD and other thermal techniques are being used for deposition of amorphous Si and crystalline silicon thin films, which are very costly and also precursors used in these techniques are highly toxic and pyrophoric in nature. Hence there is a global demand to develop simplest techniques for the deposition of Si thin films.

DMSRDE, Kanpur has successfully optimized the technology for “Bulk production of cycloorganopentasilane for deposition of Si thin films”more particularly to a non-pyrophoric and non-corrosive precursors cyclic organopentasilane precursors for deposition of silicon thin films in bulk quantity for electronic applications. The present invention also relates to the process for preparation of cyclicorganopentasilane.

Interested Industries are requested to forward their Expression of Interest (EoI) to Director DMSRDE, Kanpur (with attachments of supporting documents) with a copy of Director DIITM, DRDO HQ (without attachment) on following address:-

To,
Director
Defence Materials and Stores Research & Development Establishment (DMSRDE)
DRDO, Ministry of Defence, Government of India
PO DMSRDE, GT Road,
Kanpur-208013
Phone : (0512) 2451759-78
Fax : 0512-2450404/ 2404774

E-mail ID : **director[dot]dmsrde[at]gov[dot]in**

Copy to

Director
Directorate of Industry Interface & technology Management (DIITM)
Room No. 447, DRDO Bhawan, DRDO HQrs, Rajaji Marg, New Delhi-110011
Phone: 011-23013209/23015291
Fax: 011-23793008

Email: **diitm[dot]hqr[at]gov]dot]in**

List of Support documents to be attached with EoI

a) Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, as amended time to time)
b) Certificates of registration as a manufacturing unit, if any.
c) Audited Balance Sheet for the preceding three years.
d) Income Tax returns for the preceding three year period
e) Details of shareholding/ownership pattern especially foreign partners/ shareholders, foreign employees, directors, etc. The company must adhere to the prevailing Govt of India policies and regulations on Foreign Direct Investment (FDI)/DIPP norms as applicable.
f) Annual budget for R&D during last three years.
g) Numbers and details of IPR or patents, etc., held by the company.
h) Number of technically or professionally qualified personnel.
i) Record of past performance (e.g., Supply orders executed against of Ministry of Defence orders, Public Sectors and Paramilitary Forces, if any).
j) Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise.

k) List of Testing and Support equipment's

l) ISO/ ISI certification or any other certification

m) Relevant clearances form the authorities/ ministries (if any)

n) Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.

o) Capacity/capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.

p) PESO and DPIIT license for explosive handling if ToT is for high energy Material, explosives, propellants, and component/ system dealing with it etc (if applicable).

q) Under taking form company seeking ToT that none of its Directors, Independent Directors, non-executive Directors, Key management personnel are involved in any corrupt practices, unfair means and illegal activities.

r) Details of the industrials license for defence manufacturing be provided by the industry seeking ToTs.