Vacuum Deposition Chamber

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I. Bell jar, Fixtures and Feedthroughs

All of the fixtures and feedthroughs were disassembled. The metal parts were cleaned of residue and grease, and the O-rings were re-greased using silicone high-vacuum grease. The base plate was thoroughly cleaned and wiped down, and the system was reassembled. Much of the soot was removed from the inside of the bell jar using ethanol and scotch-brite. The gears and pulleys used to raise and lower the bell jar were oiled with WD-40 to prevent the horrendous high-pitched sound of metal on metal

II. Substrate Holder Design

A simple design for a machineable substrate holder has been drafted utilizing the four existing 3/8-16 tapped holes in the base plate. Essentially, the design is comprised of four aluminum poles which support a large circular plate. The circular plate has a square hole in the center, which is surrounded by four tapped holes for screws which will be used to affix the substrate plate into the hole. The circular plate also serves to block the line-of-sight deposition of material onto the top inside surface of the bell jar, which is only accessible to very tall people for cleaning.

III. Thin Film Deposition Monitor

A complete thin film deposition monitor set up comprises of:

- Quartz Crystal
- Ceramic Crystal Holder
- External Oscillator
- In-vacuum cable connecting the crystal (placed within the chamber) to an external point on the feedthrough.
- BNC cable connecting the feedthrough to the oscillator and the oscillator to the monitor
- Monitor to measure the film thickness during deposition
- 1” Feed through

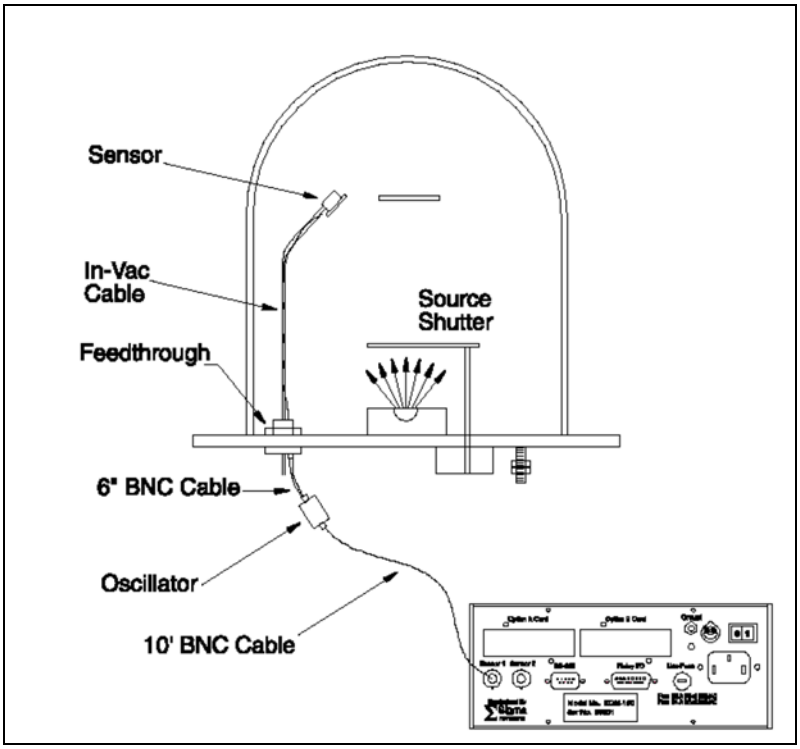

Figure 1. A simple deposition monitor set-up[1]

Some of the simple crystal monitors systems that we found were:

Inficon XTM/2	Set of 6 crystals Standard sensor holder oscillator with 15" cable 1" feed through	$2600
http://www.lesker.com/cfdocs/newweb/Process_Instruments/FilmThickness_Quartz_Inficon_XTM21.cfm		
Leybold XTC/2	Deposition controller with sensors Dual crystal sensors Crystal interface units (Brand new unit)	$4800
http://www.capovani.com		
SQM-160	Thickness monitor Remote analog oscillator module Cables 1" feed through (uncooled sensor head)	$2000
http://www.sig-inst.com/		
TM 350	Monitor	$1250

[1] Picture taken from Sigma Instruments (http://www.sig-inst.com)

http://www.maxtekinc.com/products/

Some useful links:

Design of crystals sensors heads: http://www.csrdinc.com/techbulletin4.htm

How does a monitor measure thickness: http://www.csrdinc.com/techbulletin2.htm

IV. Photographs

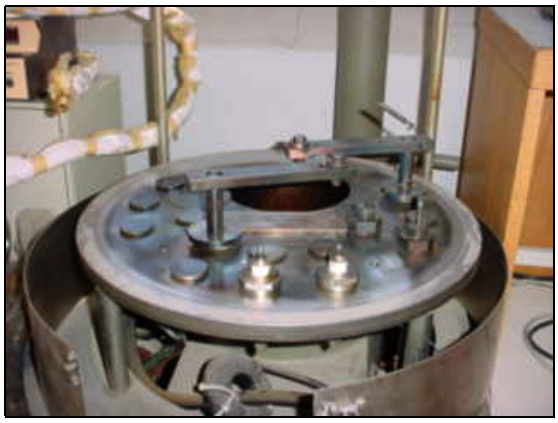

Figure 2: Feedthroughs and fixtures before disassembly

Figure 3: Source holder and electrodes before disassembly

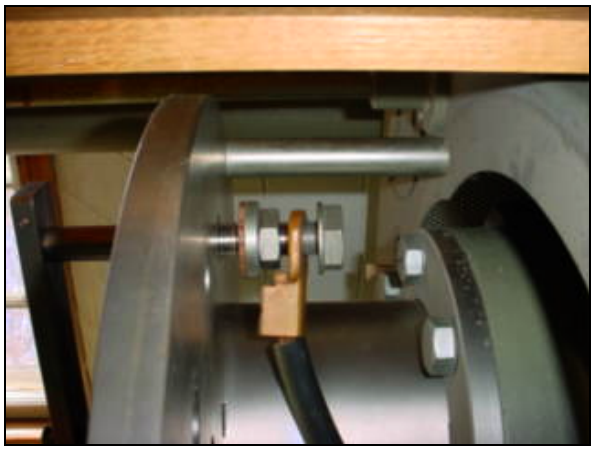

Figure 4: High voltage contact with electrode feedthrough showing location of washers, nuts, and bolts (picture found useful for reassembly)

Figure 5: Top of electrode feedthrough

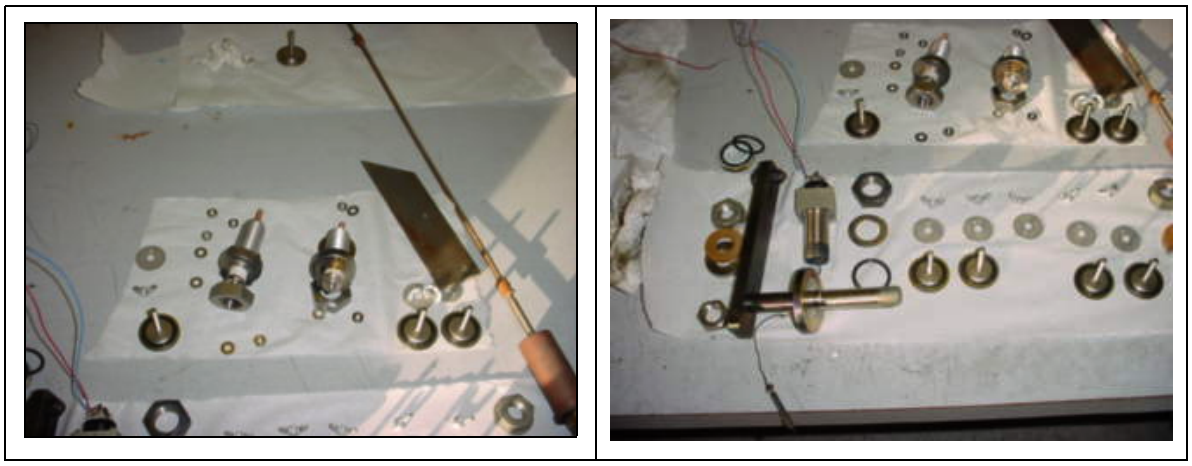

Figure 6: The many nuts, bolts, washers, and O-rings comprising the full set of fixtures and feedthroughs. All metal surfaces were cleaned of residues and dirt. All O-rings were resealed using high-vacuum silicone grease

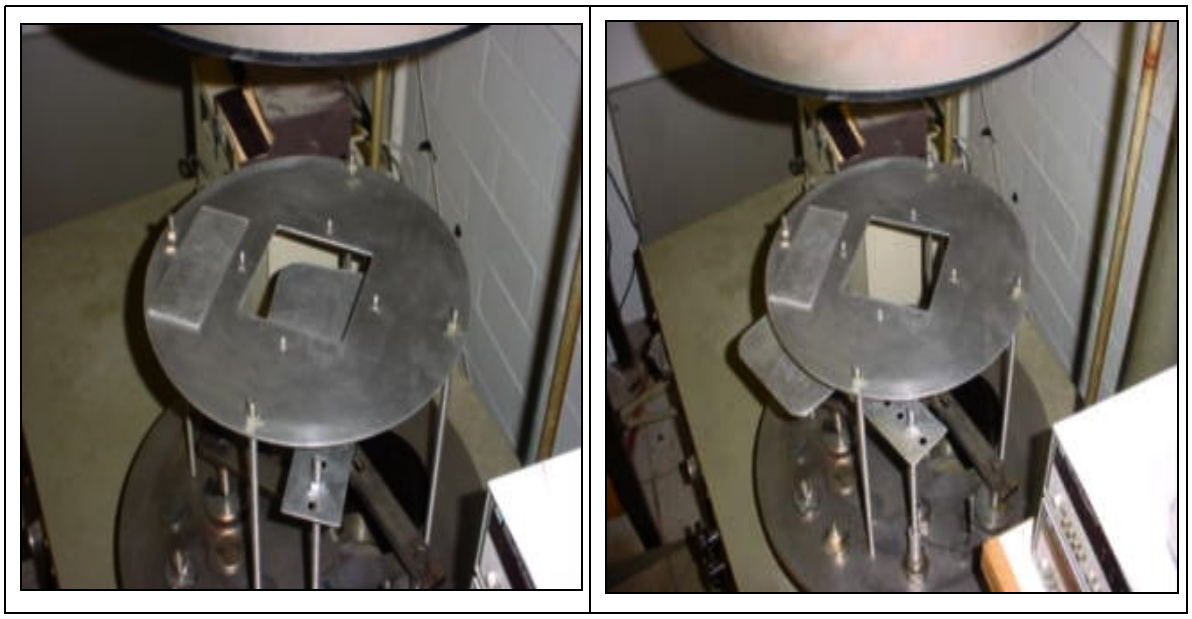

Figure 7: The brand new substrate holder with shutter mounted on the base plate.