

Mothballing Si-Li EDS Detectors Successfully

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We have looked at the problem of mothballing EDS detectors for clients going on long leave or over the Christmas period, and in some cases for indefinite periods.

The secret to storing the detectors is the pumping of the detector when you allow it to warm up. This results in pumping off all the contaminants, which are caught up in the molecular sieve in the dewar, before they can settle on the crystal and FET package. For this purpose we made up a T piece pumping port adapter.

There is a red or blue cap on the side or bottom of the detector, depending on the make. Open that and there will be the plug that needs to be removed under vacuum to pump down the detector. The pumping port adapter can be made up by your local engineering workshop.

One warning: we suggest starting the pump-down the minute the LN₂ is thrown out. On two occasions we have had the vacuum plug blow out about 30 minutes after pouring off the LN₂. So in some detectors it seems that as they warm up, they build up a positive pressure. You would expect the Be window to blow first, but not so. Exactly why this is, we are not sure.

The pumping system must be able to attain at least 10⁻⁵ Torr, so either diffusion or turbopumped systems will do. If there is a LN₂ trap in the system that trap must be used, and it is ideal to improve the level and cleanliness of the vacuum. If the SEM is also not going to be used for a week, you could make a blanking port with a vacuum port for the SEM chamber, and this would allow you to use the SEM as the pumping system. Not ideal, but it works.

Connect the vacuum system to the detector, preferably using metal bellows piping. Once the system has reached 10⁻¹ Torr, remove the vacuum plug on the detector.

We generally open the plug with only the rotary pump pumping the port and not under diffusion pump pressures. This is because some detectors have a really poor vacuum once the LN₂ is thrown out, and the diffusion pump could be damaged if you opened the detector to it.

Once the plug has been opened, leave it to pump for a minimum of 24 hours at a vacuum of about 10⁻⁴ Torr or better, until the detector is at room temperature. If your system's vacuum system does not reach 10⁻⁴ or better with the detector connected, close the port plug and check to see if the vacuum improves. If so, there may be a leak in the detector or it is badly contaminated.

If the detector is old, a bake out can be done. This means heating up the detector to ensure all contaminants are baked out of the system. Simply fill the dewar with a full kettle of boiling water. Watch the vacuum gauges at this point. In cases where the dewar is really contaminated, there will be a drop off in vacuum as soon as the warm water is poured into the dewar. Repeat this process until the vacuum does not change when hot water is added. This process could take a day or three. Once the water in the dewar has returned to room temperature (24 hours at least), carefully close the pumping port to the detector, throw out the water, and store the detector.

This is a quick description of what is involved in the process of mothballing Be-windowed EDS detectors. If you don't think you're up to it, try contacting your service company. They may be able to do it for you and then don't forget to pay them handsomely for it. Service technicians also like Porsches. ■

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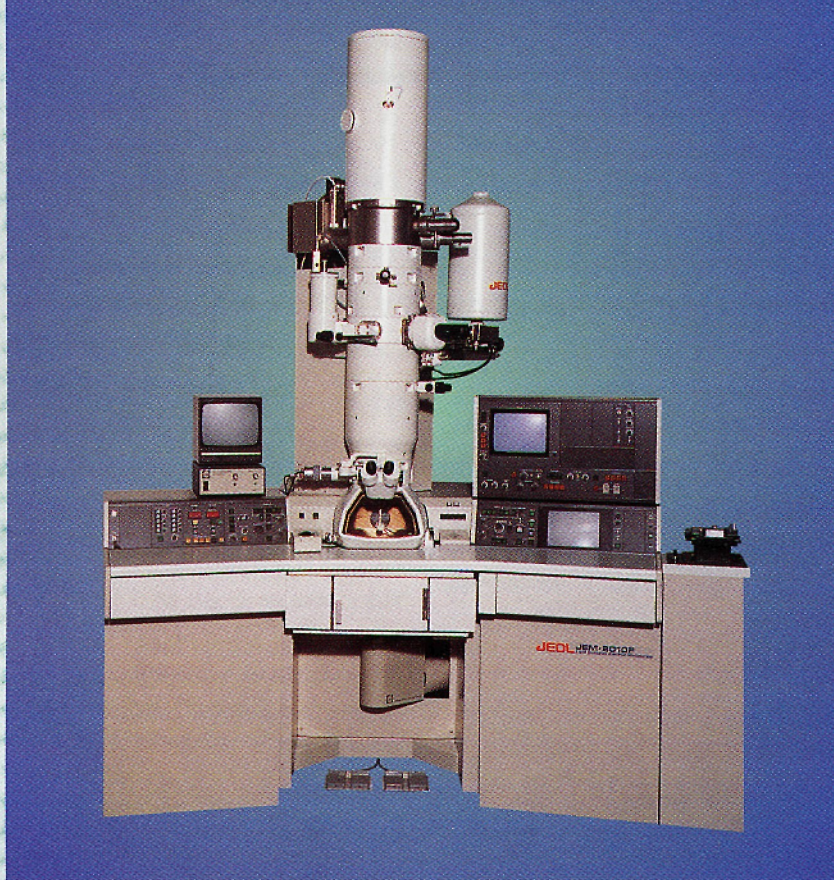
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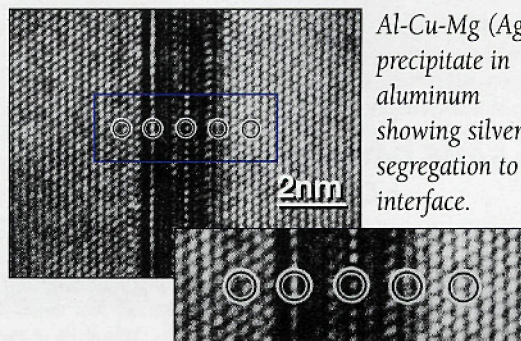
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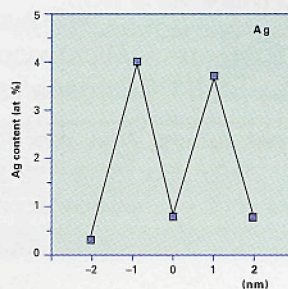
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Al-Cu-Mg (Ag) precipitate in aluminum showing silver segregation to interface.



Data courtesy of Dr. James M. Howe, Department of Materials Science & Engineering, University of Virginia, U.S.A.



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