Max-Planck-Innovation

Technology Offer

Closure Device for Evaporator Cell of a Coating System

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Background

Evaporation cells for thin film deposition often operate under ultrahigh vacuum or special gas atmosphere, requiring long growth campaigns and short maintenance openings to preserve the best possible vacuum environment. The deposition leads to coating of the inner chamber walls, the removal of which is difficult and very time consuming. Growth control and interruptions during material deposition may require frequent operation of the closure device or shutter. The commonly used shutter (Fig. 1) for an evaporator cell is a cover plate that can be opened and closed by linear movement of the coupling rod. The main disadvantage of this setup is the contamination of the surroundings apart from the sample while the shutter is open, as well as contamination of the evaporator cell with solid or liquid coating material reemitted from the shutter while the cover plate is closed. These contaminations are hard to remove. Moreover, the opening and the closing of the shutter results in pronounced shutter transients due to the shutter dependent variation of the thermal emission.

Technology

We offer a new technology to avoid the contaminations and to reduce the associated cleaning and maintenance work. Fig. 1 shows a conventional closure device with a cover plate that can be moved to open or to close the evaporator cell.

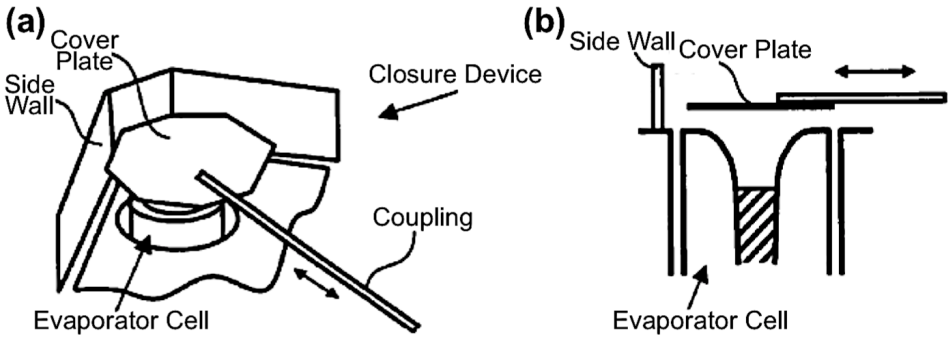

Fig. 1: Sketch of a conventional closure device for an evaporator cell. Top view (a) and side view (b).

This layout shares several disadvantages mentioned above. We propose to exchange this closure device by our closure device that is shown in the Fig. 2.

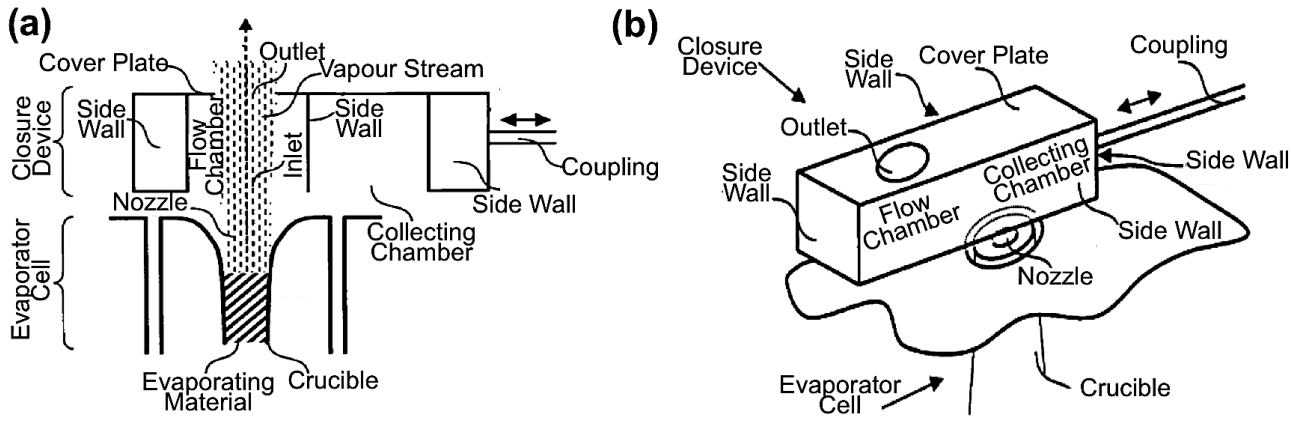

Fig. 2: Sketch of our closure device for an evaporator cell. Top view (a) and side view (b).

We designed an additional collecting chamber that is connected to the evaporator cell while the cover plate is placed in the closed position. This setup collects source material not directed at the sample both in the open and the closed position. During maintenance, the entire unit can be removed and replaced through the shutter port, thereby removing the collected source material, without having to open other ports of the deposition chamber.

In addition, because of the larger distance of the inner closure device walls from the source and the small open solid angle in the open position, thermal gradients (‘shutter transients’) are efficiently reduced and, since the material at the inner closure device walls is further away from the cell orifice and remains colder, reemission into the cell is minimized.

Advantages

- Reduced contamination of the vacuum chamber
- Reduced contamination of the cell and its immediate surroundings
- Possibility to collect the contaminants
- Simple design and handling
- Easy cleaning and maintenance

Patent Information

DE patent application filed in April 2011.