



TECHNOLOGY

Detailed Information

WEB COATING TECHNOLOGY

ZnS-Evaporator

Now available – Zinc Sulphide evaporator for the deposition on plastic films

Within only ten months, LEYBOLD OPTICS has developed, designed, implemented and qualified a new class of evaporators for the high rate deposition of zinc sulphide on plastic films. From development to qualification, the entire process has been successfully realized within a customer project. Simulations, layouts, calculations and trial experiments, combined with many years of know-how and a structured and goal oriented approach, led to another unique component in LEYBOLD OPTICS' modular toolbox.

Take the lead – create benefit

The evaporator can be installed in our new, special deposition system FLEX-M. The principle of evaporation is based on sublimation of the material in metal crucibles, which are directly heated by electrical currents flowing through. The crucibles are filled with zinc sulphide granulate or pills.



Fig 1: FLEX-M 650 – special system for the deposition of zinc sulphide, aluminium or copper on films





TECHNOLOGY

Detailed Information

Criterion for quality: Uniformity

There are several, individual crucibles distributed in transverse direction within the evaporator. The individual control, combined with the low mass of the crucibles, is the basis for the outstanding performance in terms of layer uniformity in transverse direction. The individual control allows the local tuning of the individual rate respectively layer thickness. Due to the low mass of the crucibles, a small change in power leads to a fast change of the temperature and thus a prompt change in rate.

Both, the individual control as well as the properties of the crucibles, are outstanding features. They are the basis for a high product quality and a big advantage and strong argument compared to competing technologies.

Criterion for productivity: Efficiency and capacity

The development and design of the ZnS-evaporator was substantially driven by the additional requirement for long-term processes without interruption. The high efficiency of the ZnS-evaporation, due to an optimum arrangement of the evaporator with respect to the substrates, and the capacity of the crucibles guarantee a process capability of 50 nm layer thickness at 3.0 m/s process speed over approximately 12.000 m substrate length in one turn.

Criterion for productivity: Minimum down-time

Due to the low mass of the crucibles, the heat-up and cool-down time could drastically be reduced by about 25 to 30 minutes; thereof, heat-up-time alone by five to ten minutes. A further reduction of the heat-up-time is limited by the essential heat-up ramp and the time until the energy is homogeneously distributed in the complete zinc sulphide load.

The largest part of time-savings is achieved after the process while cooling down. Competing technologies require cool-down times up to 25 minutes before venting can be initiated. The temperature of the evaporation source should be at least below 200 °C. The solution of LEYBOLD OPTICS, on the other hand, requires no time for cool-down; the venting procedure can be initiated immediately.





TECHNOLOGY

Detailed Information

Advantages and benefits

- Advanced technology
 - Individual, directly heated and low mass crucibles.
 - Highly precise, fast and local control.
- Flexibility
 - Suitable for different designs of crucibles.
- High product quality.
 - Outstanding performance in terms of uniformity.

Layer thickness 100 nm: uniformity ± 5.0 %, process speed 2.0 m/s

Layer thickness 50 nm: uniformity ± 5.0 %, process speed 3.0 m/s

- High productivity
 - Reduced down-time.
 - Reduced heat-up- and cool-down-time; savings ca. 25 to 30 minutes.
 - Capability for long-term processes without interruption.

Substrate length 12.000 m, layer thickness 50 nm, process speed 3.0 m/s

- Optimum evaporation material exploitation through optimum arrangement of the evaporator with respect to the substrate.
- Intelligent design
 - Separated clamping for crucible and cover.
 - Advanced clamping for fast refilling.
 - Removable evaporator box for cleaning purposes.
 - Tilted arrangement of the crucibles avoid blockage of crucible openings.

