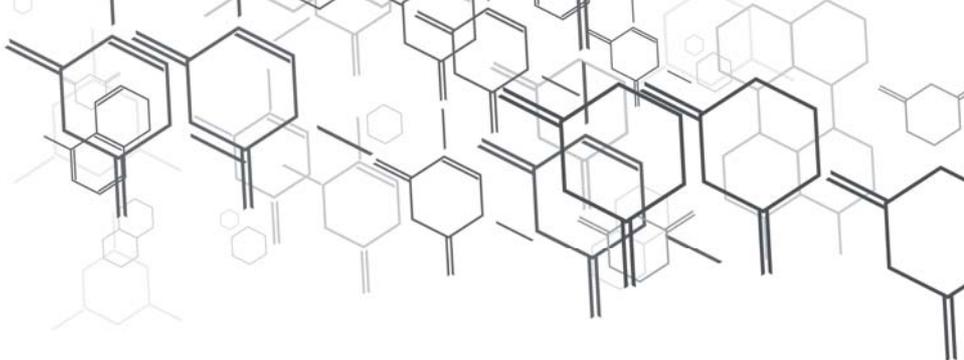
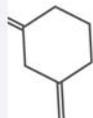


Solutions for OLEDs



The capability to release relatively large amounts of alkali metal and the ability not to generate loose particles are, no doubt, the main features of an alkali metal source suitable for building the alkali photocathodes, mostly bi-alkali, but also mono alkali type, as required by X-ray image intensifiers.

The Organic Light Emitting Diode (OLED) is emissive, so it needs no backlighting structure, allowing the thinnest possible flat panel configuration. OLEDs promise therefore the reality of flexible displays. At present, efforts are under way to make OLEDs more energy efficient than the competing display technologies, mainly through improvements of electron transfer from the cathode. SAES Getters' AlkaMax offers the unique opportunity of using a safe and stable source to lower the operating voltage, increase luminosity and improve OLED production yield.

Boosting OLED Performance

While low work function alkali metals and alkaline earths successfully lower the electron injection barrier and increase electron injection to the organic layer, their implementation as cathode materials is not easy. Control of the composition is difficult and layers such as LiF or Li₂O are insulators, so they must be kept extremely thin.

The use of a pure alkali metal layer (e.g. Li or Cs) can overcome these drawbacks: through AlkaMax, a thin layer of metallic Cesium or of another alkali metal can be easily and reliably created, exploiting all the advantages of a low work function metallic layer. Furthermore, Lithium and Cesium metals maintain constant and good performance for a wide



range of thicknesses (0.5 - 5 nm). This makes the AlkaMax technology also suitable for the realisation of the highly efficient Charge Generation Layers (CGL) in tandem OLED devices.

With AlkaMax concept it is also possible to realize Alkali Metal Doped Organic Layer (AMDOL) between the cathode and the emission layer to lower the device operating voltage. Cs has been the most effective alkali metal for this layer, as it has the lowest work function among all alkali metals and still retains this superior feature even when co-deposited with the organics.

The AMDOL can be made thick enough to prevent spikes in the ITO anode layer from causing shorts in the device.

Moreover, Magnesium or Mg composite cathodes (using the co-deposition of Silver for instance) are widely used for many OLED and TOLED device cathode structures. SAES metal dispensing technology can assure, also in case of Magnesium, stable and accurate deposition rates.

AlkaMax: an Advanced Solution for OLED Mass Production

Alkali Metal Dispensers (AMD) have been available from the SAES Getters Group for over 30 years and offer an efficient and safe method of depositing ultrapure alkali metals. AMDs keep the alkali metal pure in the form of a stable salt. AlkaMax products have been designed purposely to release enough alkali and alkaline earth metals to deal with the demands of OLED mass production, and ensure safe handling in any condition. Thanks to this feature, AlkaMax is fully compliant with the environmental regulations.

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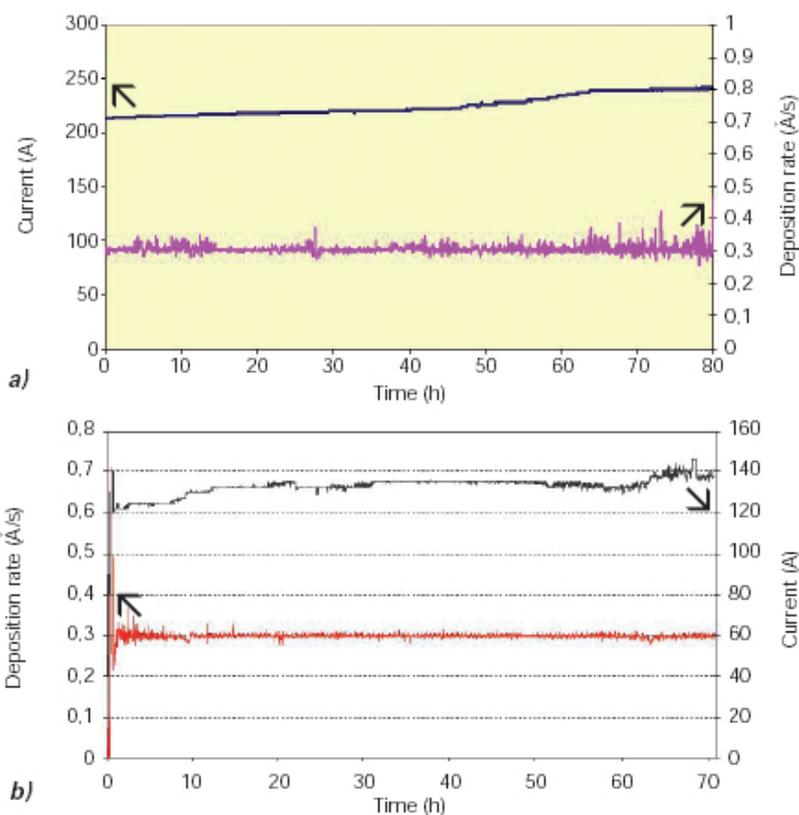
This paper contains no confidential information

Solutions for OLEDs



AlkaMax Characterization and Performance

The special design of AlkaMax can achieve the required alkali metal evaporation rate in a homogeneous, fast and easily controllable way. The SAES Getters Group integrates its offer to OLED manufacturers with mathematical modeling, which assures that alkali distribution is fully optimized for ultimate display success.



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