Workshop »Coatings for Energy Technologies«

Sputtering target solutions for smart glass, thin film photovoltaics and battery applications

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Plansee develops sputtering targets for thin film applications in display, energy and microelectronics. This presentation gives an overview on targets for energy and smart applications and will highlight recent developments with respect to materials fabricated in a powder metallurgical approach.

Molybdenum (Mo) is used as preferred back contact material in CIGS and CZTS thin film solar cells due to its sufficient adhesion on glass, good electrical conductivity and superior thermal stability during manufacturing process of the solar cells. For increased cell efficiencies, metal contacts with improved resistance and less defects will be beneficial. We demonstrate that by adding tungsten-based seed-layers, the conductivity of sputtered Mo films can be increased by up to 30 % compared to single Mo layers.

Molybdenum oxide (MoO_x) thin films have tuneable properties as hole-injection layers with potential high work function. Such wide bandgap, transparent MoO_x films show promising electronic properties and for example have been investigated as ITO replacement for perovskite solar cells. By varying the oxygen content and additional metal-doping in the oxide sputtering targets, the optical and chemical properties of the thin films are adjusted for a wide range of applications.

For electrochromic glass tungsten-based sputtering targets are used to deposit the active oxide layers. By utilizing powder metallurgy manufacturing, several tungsten-based alloys with homogeneous microstructure and high purity can be processed. The improvements in the powder metallurgical manufacturing process results in high-efficient and consistent sputtering target materials.

Ceramic and dielectric Li_3PO_4 (LiPO) sputtering targets are used to deposit LiPON films as electrolyte material in thin film batteries by applying RF sputtering. The development of doped LiPO sputtering targets with sufficient electrical conductivity benefits in high deposition rate sputtering processes using DC mode. The general thin film properties of the doped LiPON films are comparable to reference material.