Российско-германский семинар «Тонкопленочные покрытия — процессы, технологии, кооперации»

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Abstract

Large area coatings onto metal strips are important for industrial-scale thin film applications. Approved layer stacks are deposited by PVD technologies like electron beam evaporation and magnetron sputtering in huge vacuum deposition plants. High deposition rates are applied for mass production and deposition of metal and oxide films onto big coils of aluminum, copper or stainless steel, continuously.

This presentation is dealing with optical coatings for both enhanced light reflectance and efficient solar absorbance. Such industrial applications are using well specified layer stacks and thin film materials for enhanced light reflection and light absorption for solar heat collectors. Prerequisite for the essential adhesion of such industrial-scale vacuum coatings is the reliable plasma cleaning of metal strip surfaces in vacuum before PVD coatings are performed.

Considering VON ARDENNE’s approved air-to-air concept, the features of highly productive metal strip coaters up to a speed of 20 m/min are discussed. Based on the huge resources of metals and materials in Russia this presentation will offer new ideas for both R&D work and resulting functionalized surfaces on metal strips for cost efficient industrial applications in future.
Low-E Glass Coatings for Energy Efficient Buildings

Abstract

Energy costs may not be too expensive for private households and for the industry, but energy efficiency could be a profitable field of action even in Russia. Approximately 45 percent of a country's energy demand is consumed in buildings. 50 percent of the energy consumption of a building is used for lighting, cooling and heating. Consequently, the energy intensity of a country can not be reduced without the consideration of buildings. In hot climate regions, the cooling load is driving the energy consumption of buildings. Here, the filtering of the solar radiation for the visible light and the blocking of the UV- and the near-infrared radiation (g-value) in combination with the heat insulation (U-value) are the key for energy-efficient buildings.

The filtering function of the energy transmittance can be tailored within the glass coating process to maintain the visible transmittance for the lighting of buildings at daytime and to block unwanted solar energy intake by using double or triple layers of silver surrounded by oxide and nitride layers. VON ARDENNE develops and manufactures the most advanced glass coating systems GC254H and GC330H. The systems are equipped with in-house developed and manufactured key components like rotatable and planar VON ARDENNE Magnetrons. So far, more than 50 systems have been delivered to customers in the EU, the Americas and Asia. They have proven their “best-in-class” performance for more than 15 years. Furthermore, VON ARDENNE supports their customers with a global service network.

During the last 15 years, VON ARDENNE has established superior process know-how with sustained R&D activities and has gained vast experience with turnkey coating solutions. Apart from providing quality “Made in Germany” and being the global market leader in manufacturing glass coating equipment, VON ARDENNE has a broad product portfolio, including coaters for photovoltaics, concentrated solar power and the solar thermal applications.
Industrial non vacuum coatings for thin and thick layers

Abstract

To avoid costly vacuum techniques it is common in the industry to search for wet chemical (or even dry) alternatives. Frequently solvent based coatings are the first choice but more and more it is aimed to switch to water based coatings because of environmental protection. The transfer to waterbased liquids is not trivial, as the rheology and drying requirements of water are significantly different from most of the usual solvents.

Different coating techniques, from knife coating via printing techniques to slot die allow to apply layers in a dry thickness range from mm down to some nm. Rheology, wettability and last not least the concept of drying are important issues to be watched. All these concepts are addressed and described.
Non-contact electrical characterization of thin films

Abstract

Electrically functional thin films are applied in a broad spectrum of applications such as wafers, displays, touch screens, smart glass, architectural glass, solar cells, printed electronics, etc. The main measurement focus is currently directed to layer thickness, sheet resistance, optical transparency and layer uniformity. The current transition to new production technologies brings new challenges to the applied in line and offline metrology at flexible integration and decreasing costs of ownership.

Straightforward non-contact sensors can serve as an example for flexible characterization technology in a large variety of applications, while significantly lowering the costs of ownership. Metallization, TCO, nanowire and metal ink layers can be characterized with high speed, allowing to advance the layer system research, control the fabrication process and also to flexibly modify the fabrication technology.
Abstract

In this paper we present the MicroProf®, a one multi sensor metrology tool addressing nearly all analysis tasks. Results from measurements of various parameters and features on substrates (e.g. wafers) as well as chip and die level will be presented from the fully automated tool with material handling. This innovative metrology tool has shown to be a reliable solution established in hundreds of research and industry applications.

Special attention is given to the measurement of film thickness and multilayer (stack) thickness. The sensors under use are original FRT products, so OEM in line solutions and integration into production or R&D tools is also available. The systems and sensors allow for automated evaluation of the following metrological data: total thickness variation TTV, bow, warp, roughness, film thickness, step height, pitch, profile, contour, edge structures, trenches, topography, geometry, co-planarity, critical dimensions, angles, TSV, nanometrology, film thickness, multilayer thickness, thickness measurement with IR technology. Parameters may be taken local or global (mapping).

Addressed applications are in Semiconductors, MEMS, LED, OLED, PV, Printed Electronics, Organic Electronics, Batteries, Machining or Engineering from lab to production, or any Research or R&D applications.
other reports:

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  Dittfurt, Germany Dr. Manfred Danziger Dr. Andrej Matthies,
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