DS 14: Optical Layers: Basic Research and Applications

Time: Tuesday 12:00–13:30 Location: H 2032

Invited Talk DS 14.1 Tue 12:00 H 2032

Demands on Coating Technologies in the Optical Component Industry — •Marcus Serwazi — CORNING GmbH; Abraham Lincoln Strasse 30; D-65189 Wiesbaden; Germany

Based on the famous and allways interesting improvements of the coating technologies during the last years and the upcoming question for the next challenges in development it might be useful to focus on the day by day business processes handled in the coating departments in the optical component manufacturing industry. The author will show some examples of state of the art coating products and describe and summarize the process chain and the related difficulties which needs to be adressed by upcoming development projects if the 'coater' should be supported by this projects for his future success in this market. Today very powerful and sophisticated coating technologies (e.g. several sputtering technologies) are available but the decision which is the right or best technology is sometimes not driven by the overall technical capabilities of this new technologies. Other factors like cost of operation, throughput and process reliability sometimes might lead to the outcome that the best decision for the next investment is not the 'newest' and most delicate technology which might be available in the market. The author light up some of this additional factors and also give his personal opinion in what he believes what drives allways the decision for the 'best' coating technology and the related investments in the optical component manufacturing industry in our days. He tries to summarize what kind of technology independent specifications can be derived from this knowledge for future systems and investigations.

Invited Talk DS 14.2 Tue 12:30 H 2032

Optische Prüfverfahren für die Qualitätssicherung in der Schicht- und Oberflächentechnik — •Uwe Beck — BAM, Fachgruppe VI.4 Oberflächentechnologien, Unter den Eichen 87, 12205 Berlin

Optische Prüfverfahren sind prädestiniert für den Einsatz in der Qualitätssicherung, weil sie zerstörungsfrei, berührungslos und schnell Informationen komplexer Schicht- und Materialsysteme liefern. Von besonderem Interesse sind dabei Schichtdicken, topographische Merkmale (Rauheit, Welligkeit) und optische Materialkenngrößen (Brechungsindex, Extinktionskoeffizient).

Während Bauteile vom Typ Makro sind, haben Schichten und deren spezifische Ausprägungen (Herstellung, Defekte) Dimensionen vom Typ Mikro oder Nano. Von besonderem Interesse ist die ortsaufgelöste Identifikation von Merkmalen im Vergleich zur globalen Umgebung (Homogenität) oder bezüglich einer Referenzprobe (Reproduzierbarkeit). Gleiches trifft auf Vorher-Nachher-Analysen (Beanspruchung, Degradation) zu. Daher sind "Fingerabdrücke" der Oberfläche sowie Imaging- und Replika-Techniken von besonderer Bedeutung.

Es werden typische Einsatzgebiete optischer Prüfverfahren z.B. der spektralen Ellipsometrie (SE), der Streifenlichtprojektion (FP), der Weißlichtinterferenzmikroskopie (WLIM), der Atomkraftmikroskopie (AFM) und von Röntgenverfahren (RFA, XRR) vorgestellt. Der kombinierte Methodeneinsatz erlaubt die Validierung von Schichtdicken, Topographie- und Materialkenngrößen, was an ausgewählte Beispielen diskutiert wird.

Invited Talk DS 14.3 Tue 13:00 H 2032

Mixed oxide coatings for advanced fs-laser applications — •Marco Jupe[1], Marc Lappschies[1], Kai Starke[1], Detlev Ristau[1], Andrius Melninkaitis[2], Valdas Sirutkaitis[2], Igor Cravetchi[3], and Wolfgang Rudolph[3] — [1]Laser Zentrum Hannover, Hannover, Deutschland — [2]Laser Research Center, Vilnius University, Vilnius, Lithuania — [3]Department of Physics and Astronomy, University of New Mexico, Albuquerque, NM 87131, USA

A modified IBS-process was used to create mixtures of oxide coating materials. The process allows to manufacture new designs, whereas the important optical and electronic properties of the material can be varied in a wide range. Especially for ultra short pulse applications, higher damage thresholds can be achieved. In this paper, LIDT measurements of mixed and pure single layers are presented. The coatings were investigated at different wavelengths and in a wide pulse duration range. The results of the measurements confirm the empirical law of the linear LIDT dependency on the absorption gap. Based on this empirical law, the RISED concept was developed. From the data of the single layer measurements, an optimization of RISED optical components in the fs-regime will lead to even higher damage thresholds. Particularly, for high reflecting mirrors the damage threshold could be doubled for different dielectric coating materials. Additionally, the paper presents a theoretical analysis of the stack LIDT on the basis of the single layer properties.