POC012

Sputtering of TiAl-Monolayers for Highly Planar Micro-Mirror Arrays – Stress Adjustment over Target Lifetime

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Amorphous Titanium-Aluminium (TiAl) is used as mirror core material for the fabrication of microelectromechanical systems (MEMS) based micro-mirror arrays (MMA). This presentation challenges the planarity optimization of such micro-mirrors with pixel sizes ranging from 10 to 100µm processed on 200mm wafers. We present an approach for mirrors consisting of a TiAl core of 2…3µm total thickness. Using this approach, we aim at low surface RMS values close to zero after deposition and pattering as well as at a good long-term stability. We present the deposition and subsequent characterization of 250 to 2000nm thick TiAl-monolayers. To achieve a high thickness uniformity, the target substrate distance is adapted over a full TiAl-sputter target lifecycle. Pressures during deposition between 0.15 and 0.50Pa are used to set the individual layer stress. The results match well with the Thornton model of film growth and are described within a model for subsequent stress prediction. We present a model for the deposition rate depending on pressure, aimed thickness, target lifetime and target substrate distance. Additionally, we give an impression of the stability of the sputter process of the monolayers over a full TiAl-sputter target lifecycle.

Keywords
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