

OR2302

**Preparation of Al-Si-N hard coatings by UBMS using composite targets**

Joerg Patscheider<sup>1</sup>, Magdalena Parlinska-Wojtan<sup>2</sup>, Aude Pélisson-Schecker<sup>2</sup>, Peter Polcik<sup>3</sup>, Peter Pecher<sup>4</sup>

<sup>1</sup>Empa, Dübendorf, Switzerland <sup>2</sup>Laboratory for Nanoscale Materials Science, Empa, Dübendorf, Switzerland <sup>3</sup>Plansee GmbH, Reutte, Austria <sup>4</sup>Glas Trösch AG, Bützberg, Switzerland

joerg.patscheider@empa.ch

Following the experience of reactive unbalanced magnetron sputter deposition of Al-Si-N thin films by co-sputtering from two elemental targets in a confocal arrangement, the possibility to prepare similar films from alloyed Al-Si targets of different Al/Si ratios in mixed Ar-N<sub>2</sub>-O<sub>2</sub> was investigated. This geometry is especially interesting when such coatings are to be prepared on an industrial scale. It could be shown that hardness values of up to 28 GPa could be attained. The effect of oxygen - often incorporated as a contamination in coatings containing reactive elements such as Al - on the coating properties was investigated. The deliberate addition of O<sub>2</sub> to the reactive gas mixture of Ar/N<sub>2</sub> led to the incorporation of oxygen up to 20 atomic %. De-spite these very high concentrations hardness values of 25 GPa could be reached. Similar to silicon, oxygen additions cause grain refinement and a gradual disappearance of the columnar structure with increasing oxygen content. It is shown that the hardness is primarily influenced by the plasma density and to a lesser extent by other factors like silicon content and preferred orientation.

**Keywords**

magnetron sputtering

hard coatings

transparent