



Al₂O₃ COATINGS

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Alumina coatings, with the chemical symbol Al₂O₃, can be electrically insulating, chemically inert, very wear-resistant, and stable at elevated temperatures, depending on the crystalline phase and the deposition temperature. Since not all substrates tolerate a high process temperature, both a low and a high temperature version of Al₂O₃ have been developed. If needed, the Al₂O₃ coating may be combined with a TiAlN binding layer, which is converted into the Al₂O₃ coating. This combination results in an improved adhesion to the substrate facilitated by the TiAlN adhesion layer.

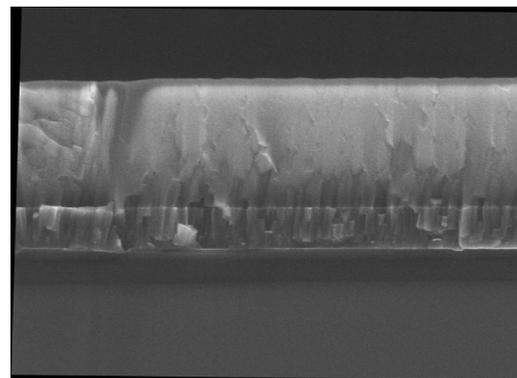


Fig. 1: Cross-sectional SEM image of Al₂O₃/TiAlN

PROPERTIES

| Low-temperature LT-Al ₂ O ₃ | |
|---|----------------------------------|
| Deposition temperature | ~250 °C |
| Hardness | 9-11 GPa |
| Thickness | E.g. from 4-6 µm |
| Structure | Amorphous |
| Chemical stability | Not stable in alkaline solutions |
| Good electrically insulating properties | |

| High-temperature HT-Al ₂ O ₃ | |
|--|--------------------------------------|
| Deposition temperature | ~530 °C |
| Hardness | 19-21 GPa |
| Thickness | E.g. from 1-3 µm |
| Structure | Gamma Al ₂ O ₃ |
| Chemical stability | High |
| Good electrically insulating properties and high wear resistance | |



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BINDING LAYER

Alumina coatings can be supplied with and without a binding layer on electrically conducting substrates as well as on insulating substrates.

APPLICATIONS

Al₂O₃ coatings are well suited as electrical insulators – especially in applications where electric insulation is needed in a sliding configuration. Other application areas could be sealing faces moved relative to each other or in connection with valve seats. Alumina coatings are also known to have non-stick properties towards various liquids and melted metals due to hydrophobic surface properties.

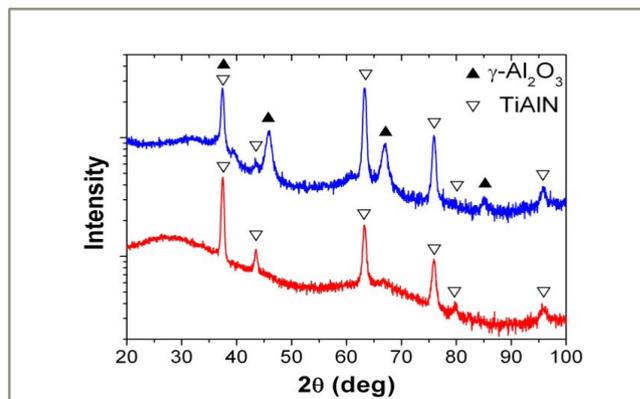


Fig. 2: XRD patterns of high temperature (blue) and low temperature (red) Al₂O₃ / TiAlN coatings