PO3003

Frequency effects in dual magnetron sputtering

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Dual magnetron sputtering (DMS) is a widely used method for the coating of large surfaces. It is especially suited for electrically insulating layers, when high density and fine grain structure are required. In DMS two sputtering targets are operated with an AC power supply so that they act alternately as cathode in their respective negative half-wave. As a working frequency, a range typically between 20 and 50 kHz is widely established.

A phenomenon that limits the possible process parameters such as sputtering rate, material composition or reactive gas supply is the arcing; this is the transition of the homogeneous glow discharge to a local arc discharge. For certain materials, such zinc-tin oxide or zirconium containing oxides, restrictions on the operating parameters may arise from frequent arcing. This effect can be mitigated by modern arc management techniques and by increasing the operating frequency.

This paper discusses the influence of the operating frequency on process stability, arcing rate, deposition rate and film properties. Some factors are considered which can mimic an influence of the operating frequency on the sputtering process. The operating frequencyhas only a minor influence on the sputtering rate, but it may have a more pronounced influence on film properties such as crystallite size.

Keywords
Sputtering
Power Supply
Frequency
DMS