

A New High Rate Magnetron: Characteristics and Applications
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A new magnetron has been designed with significantly improved characteristics. The voltage-current plots show a large increase in current for small increases in voltage. This means that only low voltages are required for high power operation. It is shown that the new magnetrons can be operated at more than three times the power level of conventional magnetrons with a corresponding three times increase in deposition rate. Examples are given of TiN coatings deposited at high rates with excellent structures and no droplets.

Examples are also given of Graphit-iC coatings deposited at high power. It has been found previously that the quality of Graphit-iC coatings deteriorates when high voltages are applied to the magnetrons and therefore only low deposition rates have been possible for Graphit-iC coatings. Coatings deposited using the new magnetrons at three times the normal deposition rate are of excellent quality as the magnetron voltage is maintained at a low value. These results have considerable significance in coatings for the automobile industry and also in fuel cell technology.

A further advantage of the new magnetrons is that the ion current drawn at a biased substrate is significantly higher when using the new magnetron as compared to a conventional magnetron when both are operated at the same power. This results in improved coating structure and adhesion.

Adhesion of Sputtered Coatings

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It is generally assumed that Sputtered Coatings have less good adhesion than those deposited by other techniques such as Arc Ion Plating. This paper demonstrates that excellent adhesion is achieved when using a well designed Sputter Ion Plating system. Recent applications depositing hard wear resistant coating onto coining dies are given and the success of these coatings is critically dependant on the adhesion.

The mechanisms involved in achieving high adhesion are discussed and the Arc Ion Plating processes are compared with those of Sputter Ion Plating.