Vacuum Arc Deposition, Coating and Thin Film (Ramot)
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Electrical Discharge and Plasma Laboratory

המעבדה להתפרקויות חשמליות ופלאסמות

A joint facility of the Faculties of Exact Sciences and Engineering

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Vacuum Arc Deposition

The Electrical Discharge and Plasma Lab at Tel Aviv University specializes in vacuum arc deposition (VAD). The vacuum arc is a high current, low voltage electrical discharge in a plasma medium comprised of vaporized and ionized material from the arc cathode. The material is emitted at minute cathode spots in the form of a highly energetic jet. Liquid droplets of the cathode material are also emitted, and removed either by magnetic filtering or re-evaporation from a hot refractory anode.

A film will form on any substrate intercepting part of the plasma jet. If performed in high vacuum, the film will be comprised only of the cathode material, which may be any conducting material. This may include pure or alloy metal films, diamond-like-carbon films produced from a graphite cathode, or even Si and B films if the cathode material is either heavily doped or heated so that the conductivity is sufficient to support the arc current. If the arc is operated in a low pressure atmosphere of a reactive gas, compound films including nitrides, oxides, and carbides can be formed.

The high energy of the depositing plasma ions generally produces good adhesion with the substrate, and dense films. The copious quantity of ions produces very high deposition rates, and hence economical robust operation. VAD is the leading technology for depositing hard coatings in the tool industry, and is further used for decorative coatings (typically with gold colored TiN) on jewelry as well as protective coatings on domestic hardware and bio-medical devices. In addition, the plasma lab has pioneered research on depositing transparent conductive oxide coatings.

Industrial Services Offered

• Consultation on candidate coatings and thin films for specific applications
• Research, development and prototype deposition service – deposition of thin films and coatings on customer's development devices
• Consultation on upscaling, supervising development of industrial coating systems

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