

## **Application of Plasma Jets for Fabrication of Coatings from Metals, Hard Alloys, Ceramics, and Their Combination**

A.D.Pogrebnyak<sup>1</sup>, Yu.N.Tyurin<sup>2</sup>

1.Sumy. State University, Sumy Institute for Surface Modification,40007 Sumy,Ukraine

2.E.O.Paton Welding Institute ,NAS of Ukraine,Kiev,Ukraine

[alexp@i.ua](mailto:alexp@i.ua)

The report is concerned with the current status of research on the use of plasma jets for the modification of surface properties of metalware, as well as of investigations of doping and mass transfer of elements. The effect of thermal plasma parameters on the efficiency of surface processing of metal materials is discussed. The structure and properties of protective coatings produced by exposure to pulsed plasmas are analyzed. A new direction for the production of combined coatings is considered. Their structure and properties were studied by the example of Fe, Cu, steels, and alloys, including titanium alloys; the modification process was shown to be controllable by the action of pulsed plasma jets. The physical factors that affect the modification process and the coating deposition, and their effect on the structure and properties of metallic, ceramic ± metal, and ceramic coatings were analyzed.

We have considered one avenue in technology . the use of thermal plasmas for producing new materials and nanodimensional powders, depositing combined and protective coatings, and modifying the surfaces of materials by exposing them to pulsed plasma jets. We have shown that the findings of an investigation into this technological sphere may be used to advantage in many branches of industry. At present, the employment of pulsed high-speed jets offers promise as a tool for obtaining new composite, highly doped materials on the surfaces of articles made of constructional materials.

The thermal plasma processing of metal surfaces is under development and will soon enjoy wide use for the compaction of powdered materials, coatings, plasma-chemical vaporphase coating deposition, and the synthesis of fine powders with nanometer-sized grains. The industrial development of these technologies is largely dependent on the progress and application of the methods for efficient inspection of the technology, and the resultant coatings and materials.