

## UKRAINIAN-GERMAN WORKSHOP «PLASMA AND ELECTRON BEAM TECHNOLOGIES FOR PROTECTIVE COATINGS»

The Ukrainian-German Workshop «Plasma and Electron Beam Technologies for Protective Coatings» was held in Kiev on 16–17 June 2010. Organisers of the Workshop from Germany were the European Joint Committee on Plasma and Ion Surface Engineering and European Society of Thin Films, and from Ukraine – the E.O. Paton Electric Welding Institute. The relevance of holding this Workshop was determined by the necessity to activate the efforts in addressing the problem of wear of tools and machine parts, which leads to a loss of about 5 % of the national product in the scopes of the world economy. Development of new innovation solutions in the field of multilayer wear-resistant coatings by vapour and gas phase deposition technologies allows reducing friction losses and extending service life of tools and machine parts. The key customers of such coatings are cutting tool industry and motor car construction.

Another high-end area of development of the surface engineering technologies includes new thermal barrier and corrosion-resistant coatings, which also contribute to extension of service life of machine parts and mechanisms and allow decreasing materials and power expenditures in various sectors of the world economy.

The program of the Workshop consisted of four groups of presentations covering the following key subjects:

- wear-resistant protective coatings;
- hard material coatings;
- thermal protection coatings;
- corrosion protection coatings.

20 papers were presented and discussed at 6 sessions. Papers were presented by three institutions of Germany – leaders in the field (Munich Technical University, Fraunhofer Institute for Electron Beam and Plasma Technology, German Aerospace Centre), by the University of West Bohemia (Czechia), Company «Hauzer Techno Coating BV» (The Netherlands), Sheffield Hallam University (Great Britain), by Russian institutions (CRISM «Prometey», St.-Petersburg, and National University of Science and Technology, Moscow), National Academy of Sciences of Ukraine (E.O. Paton Electric Welding Institute, Institute for Problems of Materials Science, Institute for Superhard Materials, Physico-Mechanical Institute, and Kharkov Institute of Physics and Technology). In addition, from Ukraine the papers were presented by associates of the Kharkov and Sumy Universities. 9 papers were presented at the poster session, including from the E.O. Paton Electric Welding Institute, Institute for Superhard Materials, Institute for Problems of Materials Science, Kharkov Institute of Physics and Technology, and National Aviation University.

The sessions of the Workshop were attended by about 100 people – Workshop participants, associates of the institutes of the National Academy of Sciences of Ukraine, students and lecturers of the Kiev Polytechnic Institute, and representatives of industrial enterprises.

The exhibition of products of the engineering centres of the E.O. Paton Electric Welding Institute was arranged.





Of high interest to those present at the Workshop were presentations made by the leaders in the area of hard nanocomposite coatings Prof. J. Musil (Czechia) and Prof. S. Veprek (Germany). They gave analysis of state-of-the-art in this area and prospects for its further development. The possibility was shown of producing such coatings with a hardness that exceeds that of diamonds, and with a high thermal stability, allowing their application at temperatures of up to 140 °C, as well as coatings that combine the high hardness and impact toughness values.

The paper presented by Prof. B.A. Movchan described achievements of the E.O. Paton Electric Welding Institute in the field of development of new nanostructural coatings by the hybrid electron beam process. New results in the field of protective EB and other vapour-phase coatings were reported in presentations by J.P. Heinss (Germany), E. Dabizha (Institute for Superhard Materials) and A. Ustinov (E.O. Paton Electric Welding Institute). Results of development of new nanocomposite coatings produced by magnetron sputtering were covered in presentations made by Yu. Borisov (E.O. Paton Electric Welding Institute), V. Ivashchenko (Institute for Problems in Materials Science), N. Azarenkov (Kharkov Institute of Physics and Technology) and V. Kiryukhantsev-Kor-

neev (National University of Science and Technology, Moscow). R. Braun (German Aerospace Centre) in his presentation told about development of new thermal barrier coatings for parts of  $\gamma$ -titanium–aluminium alloys, and Yu. Borisov (E.O. Paton Electric Welding Institute) described the thermal barrier coatings with quasi-crystalline and approximant structure.

The papers presented at the Workshop were published on the site of the European Society of Thin Films.

The joint memorandum on collaboration between research organisation of Ukraine and Germany in the field of surface engineering, including preparation of the collaborative research program, and arrangement of joint workshops on various issues of surface engineering was prepared and signed on the basis of the Workshop results. An important outcome of the Workshop was that during it the scientists from Ukraine and Western Europe involved in surface engineering could establish personal contacts, which should lead to activation of international cooperation. In particular, a contributory event was communication of the Workshop participants during the evening boat trip along the Dnieper River.

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