LITHUANIAN ENERGY INSTITUTE

ADMISSION TO PHD STUDIES FOR THE YEAR 2025

DOCTORAL RESEARCH TOPIC:

The influence of plasma jet parameters on the formation and properties of ceramic composite coatings

RESEARCH FIELD:

Energetics and Power Engineering (T 006)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

Chromium oxide coatings, due to their unique properties (wear and corrosion resistance), are widely used in energy, aeronautics, automotive industry, and thermal engineering applications. However, the application of Cr2O3 coatings for the tribological systems is limited by the insufficient adhesion to the substrate, high friction coefficients and low wear resistance under dry lubrications conditions. The coatings of chromium oxide composites deposited by the plasma spraying have higher wear and corrosion resistance, lower friction coefficient and are more plastic. The use of various materials additives to the Cr2O3 matrix provides formation of self-lubricant composite coatings, improves wear and corrosion resistance properties. However, it is important to determine the optimal plasma flow temperature and velocity, to understand the processes of plasma jet and feedstock particles interaction, to calculate the heat transfer to particles, to evaluate the influence of substrate temperature, etc in order to spray Cr2O3 composite coatings with desirable properties. The research of corrosive and tribological (at non-lubricated conditions) properties of Cr2O3 composite coatings are fragmentary. There is a lack of fundamental studies on the effect of the plasma flow characteristics, particle size and shape, plasma type, etc. on the properties of chromium oxide composite coatings. The main aim is to deposit chromium oxide composite coatings with improved tribological and corrosive properties using plasma spraying technology and to determine the influence of plasma flow characteristics on the properties of coatings.

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