LITHUANIAN ENERGY INSTITUTE

ADMISSION TO PHD STUDIES FOR THE YEAR 2025

DOCTORAL RESEARCH TOPIC:

Investigation of plasma involved processes for converting various types of waste into valuable secondary raw materials and gases

RESEARCH FIELD:

Energetics and Power Engineering (T 006)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

With the rapid increase in resource consumption worldwide, the amount of various types of waste is also growing. Waste management, recycling, reuse, and the implementation of different management strategies are becoming increasingly urgent tasks in modern society. Waste is most commonly recycled using traditional thermal methods. However, there are categories of waste for which conventional processing methods are ineffective and pose risks to the environment and human health. To successfully break down wastes that contain hazardous compounds, the processing temperature needs to be raised above 1500 °C and maintained for 3–4 seconds. In such cases, it is highly advantageous for the industry to implement plasma technologies, which allow the processing waste to be broken down into simple, non-toxic materials. The technological properties of plasma treatment play an essential role, as they enable extremely high temperatures and activation energy levels, allow for short reaction time, neutralize up to 99.99% of hazardous substances, are independent of fuel sources, and can also produce valuable solid materials and synthetic gases for reuse. Additionally, no secondary pollutants are created during the plasma waste treatment process. Due to these properties, plasma technologies are regarded as an advanced and promising method of waste management. However, fundamental knowledge is currently lacking about the processes occurring in the plasma processing of various materials and wastes and the extraction of valuable products.

**The object of this research** is the application of atmospheric pressure plasma technology in waste (composite materials, industrial waste, contaminated materials, etc.) treatment and conversion processes.

**The aim of the work** is to investigate the decomposition processes of selected wastes in a plasma environment, determine the optimal conditions for the conversion process, and analyze the regularities and mechanisms of these processes.

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