



DOCTORAL RESEARCH TOPIC:

Production and storage of synthetic gas using plasma-chemical decomposition of organic waste and process research

RESEARCH FIELD:

Energetics and Power Engineering (T 006)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

As the world's population increases and industrial production expands, more and more waste of various origins appears. We have to solve the problems of waste utilization, recycling and secondary use. Recently, more and more attention has been paid to the use of waste as secondary raw materials and energy production (principle of the circular economy). Energy from secondary raw materials can be recovered in a number of ways, one of which is the production of green/synthetic hydrogen. Currently, a particularly big problem is related to waste of various organic origin, such as various plastics with various modifications of polypropylene, etc. The chemical composition of most plastics and various organic compounds consists of elastically bonded hydrogen atoms. After regeneration, hydrogen can be used as synthesis gas to produce different types of energy. To solve this problem, the plasma-chemical method of waste decomposition can work well, where all waste is completely neutralized to a non-hazardous phase using plasma of water vapor (or other gases). Sufficiently high temperature of the ionized gas/steam stream (1800 °C and depending on the origin of the waste) helps to ensure the complete decomposition process of the waste. After receiving synthetic gas (e.g. hydrogen, etc.), it is necessary to separate it from the general gas flow and store it. For this purpose, it is planned to create a special device/cell for the storage and separation of synthetic gas based on the use of MOF materials and spatial structures.

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