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Novel plasma technologies for synthetic liquid fuel production

The important modern problem is search for alternative energy sources to provide replacement of fossil fuel, in particular in production of liquid fuels. One of the ways to solving the problem is plasma processing of variety of organic containing materials, namely (municipal, wooden and agricultural wastes, energy crops, plastics, car tires, etc as well as coals, oil shale, and so on.) and plasma conversion of methane of associated petroleum gas (APG) , as well as new methods of energy storage. The advantages of novel plasma technologies are discussed in comparison to traditional methods. Plasma based technologies for gasification and conversion are remarkable for efficiency, high temperature and purity of target product and simplification of the process in general. Application of plasma as oxidizer allows to exclude catalysts of synthetic gas (syngas) production. The temperatures of the process reach about 1400 °C under atmospheric pressure. Plasma composition can be varied in favour of target syngas production. At the same time the problem of carbon dioxide utilization can be solving. The basis of plasma technologies is plasma generator that determines special features of them. The plasma generators developed and constructed in IEE RAS are notable for several parameters. Firstly IEE RAS plasma generators use alternating current, high voltage and low currents what provide their efficiency and long resource of work. The plasma generators are working in long-term mode at inert gases and hydrogen, and at oxidizing media (air, steam, carbon dioxide, etc) and at other gases. Special types of plasma generators with different power can be applied to different tasks, for example : low heat raw material processing is performed by using air plasma generator, coal gasification is done with steam one, and methane and APG conversion by use of one working at mixture of air, steam, carbon dioxide, and in special cases methane can be added.

Biography

Philip Rutberg Academician RAS, Prof., Dr.of Sc., graduated from Leningrad State Polythechnical University. He is the director of IEE RAS He has published more than 500 papers in reputed journals and serving as an editorial board member. The major interests are concentrated in physics of dense low temperature plasma, discharges in gas flows, powerful gas discharges in dense media, pulsed discharges in liquids, as well as constructions of different types of dense plasma generators and their electrical supply systems, plasma technologies for waste treatment of different types, renewable energy generation and synthetic liquid fuels production.

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