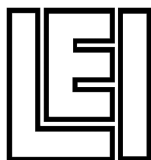


Implemented projects

- SCIENTIFIC GROUP TECHNOLOGICAL DEVELOPMENT PROJECT
"CERAMIC FIBER CATALYST FORMED BY PLASMA TECHNOLOGIES FOR REDUCING POLLUTION EMISSION"
- ENERGY FOR THE FUTURE PROJECT
"RESEARCH OF LOCAL FUEL THERMAL DECOMPOSITION PROCESSES BY DEVELOPING EFFICIENT AND ECOLOGICAL TECHNOLOGIES"
- ENERGY FOR THE FUTURE PROJECT
"CONVERSION OF ORGANIC WASTE IN WATER VAPOUR PLASMA BY REDUCING ENVIRONMENTAL POLLUTION"
- STATE-FUNDED WORK
"SYNTHESIS OF CARBON COATINGS IN ARGON-ACETYLENE AND IN ARGON-HYDROGEN-ACETYLENE PLASMA AND INVESTIGATION OF THEIR PROPERTIES"
- EU SUPPORT MEASURE
"PROMOTION OF HIGH INTERNATIONAL LEVEL SCIENTIFIC RESEARCH" PROJECT
"DEVELOPMENT OF INNOVATIVE THERMAL DECOMPOSITION TECHNOLOGY AND ITS APPLICATION FOR UTILIZATION OF WASTEWATER SEWAGE (INODUMTECH)"
- LONG-TERM INSTITUTIONAL SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT PROGRAM
"EXPERIMENTAL AND NUMERICAL INVESTIGATIONS OF COMBUSTION AND PLASMA PROCESSES FOR ENHANCEMENT OF ENERGY GENERATION TECHNOLOGIES AND RENEWABLE BIOFUEL AND FOR REDUCTION OF ENVIRONMENT POLLUTION"
- INDIVIDUAL PROJECT IN THE COST TD1208
"PLASMA IN LIQUIDS ACTIVITY APPLICATION OF WATER VAPOUR PLASMA FOR LIQUID WASTE PROCESSING"



Breslaujos g. 3
Kaunas, LT-44403
Lithuania
tel. +370 37 401805
fax. +370 37 351271
www.lei.lt

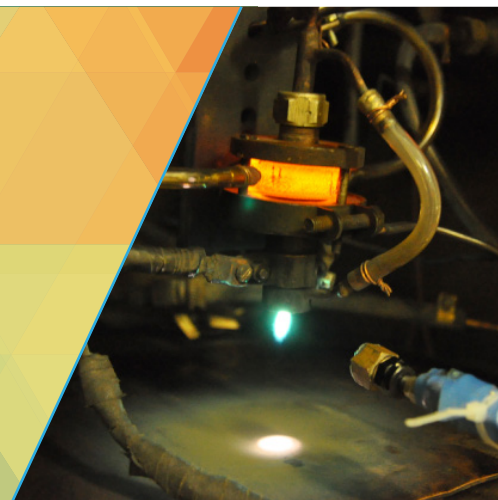


HEAD OF LABORATORY:

Dr. Vitas Valinčius
tel. +370 37 401896
vitas.valincius@lei.lt
www.lei.lt

PLASMA PROCESSING & APPLICATION

LABORATORY OF
PLASMA PROCESSING



Areas of research

- DEVELOPMENT AND RESEARCH OF DC PLASMA SOURCES FOR WIDE RANGE OF APPLICATIONS;
- RESEARCH OF PROCESSES AND PHENOMENA TAKING PLACE IN DISCHARGE CHANNELS, EXHAUST PLASMA JETS AND FLOWS;
- DIAGNOSTICS OF PLASMA AND HIGH-TEMPERATURE FLOW AND DEVELOPMENT OF DIAGNOSTIC MEASURES;
- RESEARCH ON INTERACTION OF PLASMA JETS AND SUBSTANCES IN VARIOUS PLASMA-TECHNOLOGICAL PROCESSES;
- SYNTHESIS OF MICRO- AND NANO- DISPERSED GRANULES AND MINERAL FIBER FROM HARDLY MELTABLE MATERIALS AND ANALYSIS OF THEIR PROPERTIES;
- SYNTHESIS OF CATALYTIC AND TRIBOLOGICAL COATINGS IN PLASMA AMBIENT & ANALYSIS OF THEIR PROPERTIES;
- RESEARCH OF THERMAL AND HETEROGENEOUS PROCESSES FOR REACTING PRODUCT FLOWING AROUND CATALYTIC SURFACE;
- RESEARCH AND IMPLEMENTATION OF PLASMA NEUTRALIZATION PROCESS OF HAZARDOUS SUBSTANCES;
- FORMATION AND MODIFICATION OF CONSTRUCTIONAL MATERIAL SURFACES IN PLASMA;
- GENERATION OF WATER VAPOUR PLASMA AND ITS APPLICATION FOR FUEL CONVERSION AND NEUTRALIZATION OF HAZARDOUS WASTE.

LAB OVERVIEW

Researchers of the Laboratory of Plasma Processing have over 40 years of experience working in different fields of development, scientific research and application of atmospheric and reduced pressure plasma and are able to successfully simulate new plasma technologies, using plasma equipment, designed in the Laboratory.

Different composition gas and its mixtures are used for plasma jets formation.

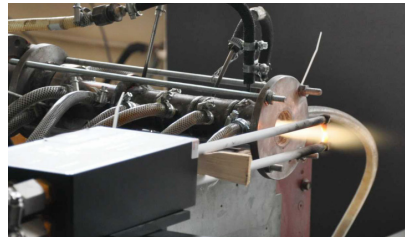
The Laboratory contains pilot production technological equipment, which is used to change and modify mechanical, tribological, chemical and optical properties of layers of different material surfaces.

Constant updating of technical base, development and disposal of available analytic equipment enables to perform research of plasma sources, diagnostics of plasma flows and jets, analysis of gas dynamic characteristics and heat-mass exchange.

DIAGNOSTICS OF PLASMA AND HIGH TEMPERATURE JETS

Formation of high-temperature and plasma jet, its dynamics, heat exchange in the channels of different configuration, their cells, and in elements of heat exchangers are investigated in the Laboratory.

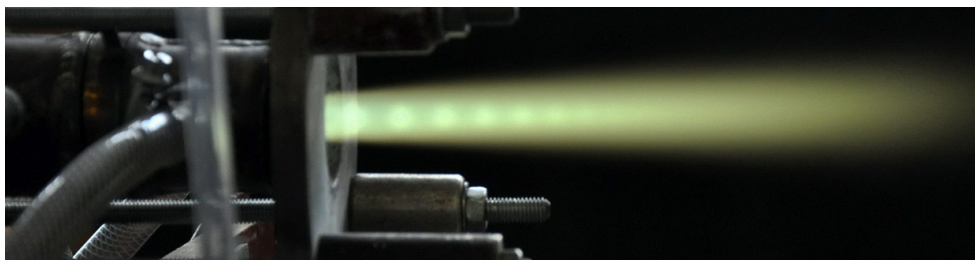
Plasma diagnostics is performed by applying numerical and experimental methods.



Heavy particle temperature measurement by double Langmuir probe

DEVELOPMENT OF PLASMA SOURCES AND RESEARCH OF PLASMA JET

The Laboratory of Plasma Processing develops new plasma generators up to 200 kW of capacity.



Air plasma jet discharged from direct current linear plasma generator

SYNTHESIS OF COATINGS IN PLASMA FLOWS

Catalytic, tribological and protective coatings formation as well as for hard ceramic coatings, which are employed for improving the operational characteristics of constructional material surface layers in mechanics, chemistry, energy and medicine.

MELTING OF CERAMIC MATERIALS AND SYNTHESIS OF HIGH-TEMPERATURE METAL OXIDE FIBER

Plasma technology is the only alternative to obtain a high quality high-temperature resistant fiber. Plasma formed fiber has unique properties such as resistance to high temperature, low thermal conductivity, and high chemical stability.

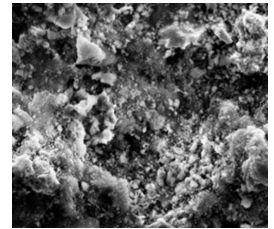
Cheap and widely spread in nature ceramic materials (quartz sand, dolomite, clay, aluminium oxide, industrial ceramic waste, etc.) are used as raw materials for producing heat resistant ceramic fiber.

THE IMPACT OF HIGH TEMPERATURE AND VELOCITY ON THE STRUCTURE AND EROSION OF THE MATERIALS

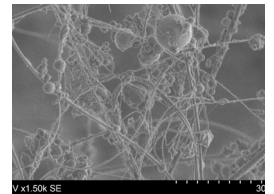
The temperature of plasma jet is 1600–7500 K, while its velocity reaches 150–750 m/s.

WATER VAPOUR PLASMA TECHNOLOGY

The decomposition of different types of waste using water vapour plasma method, due to unique plasma properties, is characterized as an extremely environmentally friendly process. The plasma process uses raw material and water vapour as a coolant. In this type of plasma, practically all endothermic reactions can be carried out and the most persistent chemical compounds can be broken down to atoms. Using such plasma technology the synthetic gas ($\text{CO} + \text{H}_2$) can be derived by decomposing the organic waste.



Catalytic Al₂O₃ and amorphous graphite-type coatings



Formed ceramic fiber and fiber with catalytic particles



Investigation of behaviour of hard alloying materials in high temperature zone



Water vapour plasma torch for the organic waste treatment