Seminar

Institute for Plasma Research

Title : Investigation of plasma dynamics in a non-thermal plasma reactor for exhaust gas treatment

Speaker : Dr. Abhijit Boruah, FCIPT, Institute for Plasma Research, Gandhinagar

Date : 2nd June 2021 (Wednesday)

Time : 10:30 AM

Venue : Online- Join the talk:
https://meet.ipr.res.in/Abhijit_Boruah_PDF_Extension_talk

Abstract:

Environmental pollution is the biggest threat to the present-day society. Stringent exhaust emission standards are being imposed all over the world to restraint pollution, which demands new innovative technologies with better engine design concepts, new fuels, catalysts and after treatment systems. Non-thermal plasma has huge potential in reducing the pollutant levels of exhaust gases as suggested by various studies in recent times. However, commercial availability of plasma-based technology is not found yet due to lack of complete understanding of plasma dynamics, plasma chemistry, fluid dynamics and engineering issues like power optimization, clogging of particulate matter, cost etc. We have designed and developed three different types of plasma modules to investigate DBD plasma parameters, reaction chemistry of different components of exhaust and effect of fluid dynamics. Few factors are being considered while designing the modules such as low power consumption, ruggedness, high temperature resistance, high gas residence time. Current and voltage characteristics as well as dissipated power between modules are compared. One module with knurled inner electrode and multi-winding in outer electrodes shows better performance than others due to edge effect. Initial test on typical smoke using these modules shows substantial reduction after treatment. A diesel exhaust laboratory containing a diesel generator, load bank, control valves, control emission monitoring system (CEMS) is also being set up to perform treatment experiments. Exhaust gas from diesel generator at different load conditions will be passed through plasma modules for treatment. Chemical and physical composition before and after treatment will be monitored by CEMS. Primary aim of the work will be simultaneous removal of particulate matter, NOx and SOx. Suitable modules will be upgraded into prototypes.
