Microwave Induced Plasmas for Marine Diesel Engine Emission Control

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***Abstract* - Shipping represents the most important means of transportation today while the exhaust gases emission from ships has been recognised as a main source of pollution causing a significant impact not only on human health but also on the world economy. The trend in environmental legislation is such that primary engine modifications will not be sufficient to meet all future emissions requirements and innovative highly efficient exhaust after-treatment technologies will need to be employed. Potential solutions to meet those requirements are non-thermal plasma techniques based on electron beams and microwave discharges due to their advantages such as lower costs, higher removal efficiency and smaller space volume onboard ships. A synthetic gas mixture similar to typical exhaust gas composition of a slow speed two stroke marine engine is treated in a laboratory scale microwave-induced plasma reactor. The NO_x and SO_x removal efficiency under several power settings is monitored using a complete integrated emission system subject to MARPOL Annex VI and the MEPC.103(49) protocol guidelines requirements. This non-thermal plasma experiments demonstrate the capabilities of such a technique to achieve reproducible synthesis of the reactive species in fast reactions and by-product removal while maintaining plasmas in a complex gas environment, thus demonstrating the viability of the use of microwave induced plasmas for treatment of marine diesel exhaust emissions. This study is a part of the DEECON (Innovative After-Treatment System for Marine Diesel Engine Emission Control) FP7 European project.**