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Microdischarges in Ceramic Honeycombs and Foams

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Atmospheric pressure non-equilibrium microplasmas are very attractive tool often used for various applications, such as surface modifications, and environmental and biomedical treatment. The microplasmas can be generated by various types of electric discharges, such as dielectric barrier discharge, micro-hollow cathode discharge, capillary plasma electrode discharge, etc. The paper presents two other sources of microplasmas – microdischarges inside the capillaries of ceramic honeycomb monolith and porous ceramic foams. The discharge inside honeycomb are generated by a superposition of either a barrier discharge inside catalytic pellet bed or diffuse coplanar surface barrier discharge coupled in series with DC powered honeycomb monolith. The microdischarges inside the ceramic foams develop from the surface barrier discharge in case the amplitude of the applied voltage and pore size diameter are optimized. Both discharges produce the relatively cold microplasmas with high level of non-equilibrium. The basic electrical and optical characteristics of the discharges, addressing the effects of dimensions of capillaries and pores, applied voltage, discharge power and used gas mixtures will be discussed. The presented atmospheric microplasmas can be easily utilized in a common plasma-catalytic system and are believed to have a potential for effective flue gas treatment.

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