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Volatile organic compound-treatment in air with a surface dielectric barrier discharge array

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Volatile organic compounds (VOC) are emitted in any (car) painting plant. The government regulations in many countries are based on toxicity of different VOC. Just recently, for example in Germany, the critical value for formaldehyde has been decreased to 2 mg/m³ in exhaust systems. State of the art technology in painting plants is based on thermal combustion, realized with domestic gas burners running day and night with high power ranging from several 10 up to several 100 kW. With that technology, high conversion of VOC to CO₂ and water is ensured but the energy effort is large. In particular for processes where low VOC loads in air (1000 ppm) are treated, the energy efficiency of thermal burners is very low. Therefore, plasma technology provides a very interesting alternative. It is based on dielectric barrier discharge technology (DBD) but is modified to surface DBD (SDBD), to adapt it to the given tasks and boundary conditions like high throughput, small drop in pressure, scalability up to 104 m³/h and much more. In this talk, very basic investigations on SDBD for the fundamental plasma parameters are presented, the conversion efficiency of real exhaust gas in car painting plants are shown and its perspective for near future VOC plasma treatment are given.

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