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BOOK OF ABSTRACT

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Properties and applications of plasma actuators based on
Surface Dielectric Barrier Discharges

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Surface Dielectric Barrier Discharges (SDBD) are atmospheric pressure cold plasma devices where microdischarges happen in a thin air layer just above an insulating material surface. Besides other uses, this feature makes these devices interesting for aerodynamics, being particularly suitable in order to energize the boundary layer of airflows surrounding objects, an application known as plasma actuator [1]. As a matter of fact, many experimental studies have proved that SDBDs can generate an induced airflow of several m/s. Here we present experimental results concerning the spatial structure of the induced flow, in particular when the discharge undergoes a transition to the filamentary regime.
On the other hand the plasma state produced in these devices consists of a high rate repetition of nearly independent discharge events happening in short times (a few tens of nanoseconds)and within a small spatial extension (a few hundreds of microns), i.e. microdischarges [2]. Here we present some results of an experimental campaign concerning the statistical properties of microdischarges which build up the SDBD. In particular we have studied single microdischarge current events, which have been measured with a fast current probe (100 MHz bandwidth) collected by a small portion of the electrode expressly sectioned [3]. Differences in the amplitude, duration and transported charge associated to the microdischarges have been measured in correspondence of various phases of the discharge events. This could be correlated with the induced velocity field, because the boundary layer flow is influenced by collisions between neutral air molecules and charged particles moving in the discharge region.
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#P019 - TiO2 PHOTOCATALYTIC GLUCOSE CONVERSION TO H2 AND HIGH VALUE CHEMICALS

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The conversion of biomass to chemicals has been the subject of intense research during the past decade. Different technologies are used to this aim as high temperature pyrolysis and gasification into syngas and bio-oils, conversion at supercritical conditions, biomass liquefaction, biological methods. The above methods suffer from some drawbacks such as harsh reaction conditions, high energy consumption, low selectivity. Heterogeneous photocatalysis can be considered a viable alternative since the process can be carried out under mild conditions of temperature and pressure. Glucose, which is a major component of biomass, can be used as a model compound for the sustainable production of high value chemicals. In this work it is reported the conversion of glucose in aqueous dispersion of various TiO2 based photocatalysts. Aerobic and anaerobic conditions were used to study the distribution of the products both in the liquid (arabinose, gluconic acid, fructose and formic acid) and gas (H2 and CO2) phases. Commercial and home prepared bare and Pt-supported TiO2 samples were used as the photocatalysts. The Pt-TiO2 samples have been tested under anaerobic conditions. The photoreactivity runs were carried out at room temperature in a 800 mL Pyrex cylindrical photoreactor irradiated in the UV region with a 125 W medium pressure Hg lamp. The initial aqueous glucose concentration was 1 mM. The identification and quantitative determination of its products were performed by HPLC whereas the CO2 and H2 evolution was followed by GC-TDC analyses. The distribution of the products was different in the presence of the various powders and the presence of Pt resulted essential for the anaerobic production of H2 as no hydrogen was detected by using naked TiO2 photocatalysts. The home prepared samples resulted more active than the commercial ones. The rutile polymorph was the most active sample both for glucose conversion and H2 formation.

#P020 - Molecular mechanism of Bacillus subtilis GabR, a pyridoxal 5′-phosphate dependent transcriptional activator

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