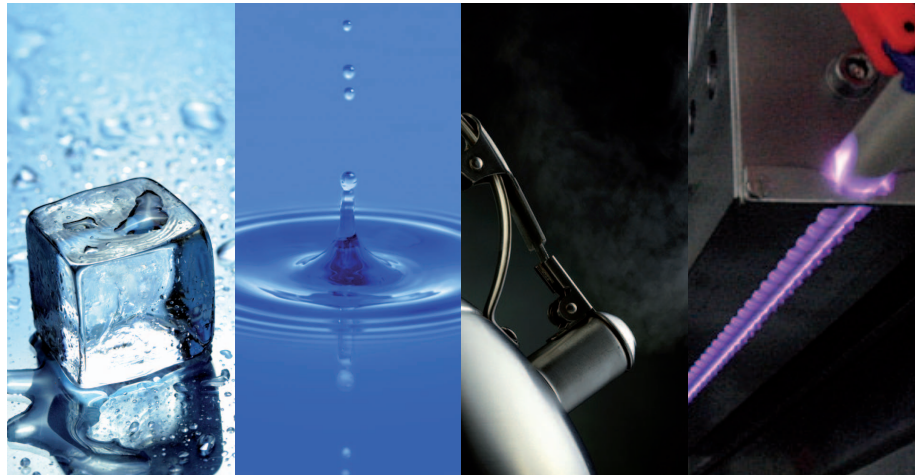


SDBD PLASMA FOR SURFACE MODIFICATION

TNO innovation
for life

WHAT IS PLASMA?

Plasma is an ionised gas and also known as the fourth condition of a material, next to solid, liquid and gas.



Ice H₂O

Water H₂O

Steam H₂O

Plasma
 $e + H_2O(g) > H^+ + OH + 2e$

TYPES OF PLASMA

There are many types of plasma which can be classified in 4 groups according to the conditions thermal and non-thermal, vacuum and at atmospheric pressure. SDBD plasma (Surface Dielectric Barrier Discharge) from TNO is non-thermal plasma at atmospheric pressure. This makes it widely applicable and relatively cheap to use.

THERMIC PLASMA

VACUUM



Inductively coupled plasma

ATMOSPHERIC PRESSURE

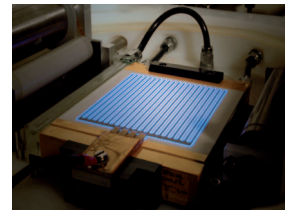


Plasma torch

NON-THERMIC PLASMA



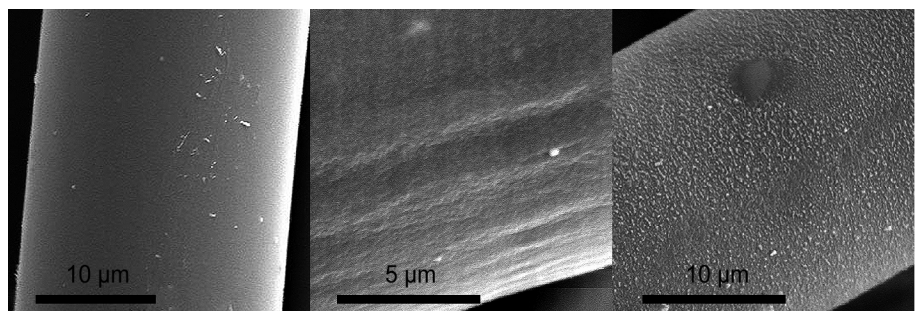
Semiconductor etching



TNO SDBD plasma

WHAT CAN YOU DO WITH PLASMA?

With plasma you can modify the surface properties for instance to improve adhesion, wettability or roughness. New characteristics can be added without changing the bulk properties like strength of feel. Plasma can also be used for cleaning or disinfection of surfaces or gasses. This provides a dry treatment, without the use of chemicals that can cause environmental issues.



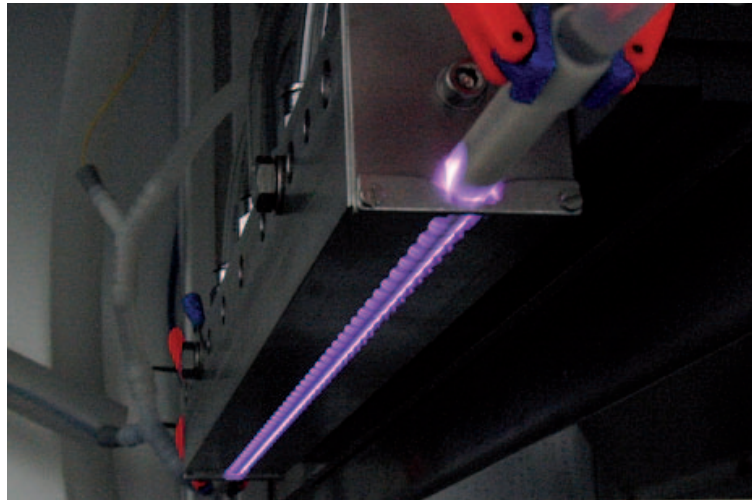
No plasma

N₂ plasma

CO₂ plasma

CHARACTERISTICS OF SDBD PLASMA

- Atmospheric pressure
- At room temperature
- Very accurate controlling
- Dry process
- Low use of energy
- Homogenous treatment
- Usable on any material
- Treatment of 3D objects
- More effective treatment than Corona which results in higher functionalities and shorter treatment times.

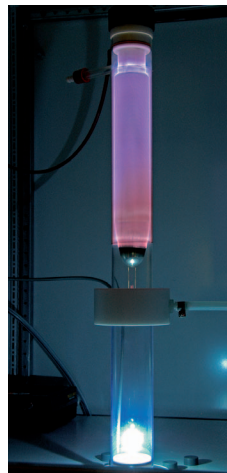


SDBD Jet

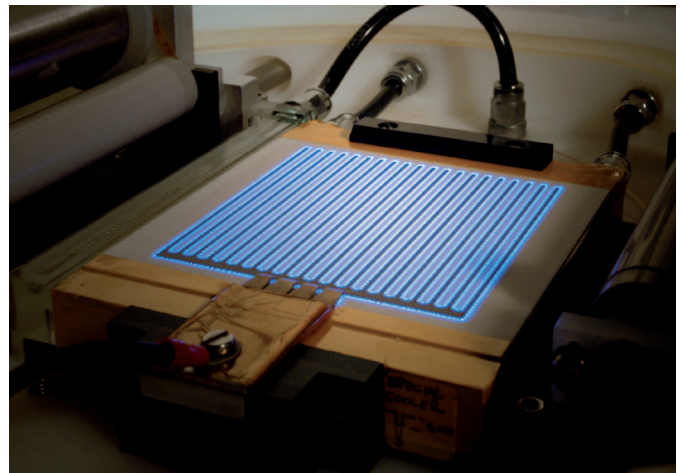
TNO SDBD PLASMA CONCEPTS

TNO has three different concepts based on SDBD plasma.

- SDBD Jet: a gas is blown passed an electrode. A curtain of plasma is created with which a surface can be treated at a certain distance. This is the best option when an uneven surface or 3D object has to be treated.
- SDBD Fluidized bed: particles are blown past the electrode. A concept suited for treating particles like powder or grains.
- SDBD Flat bed: a ceramic surface with deposited coating. This concept is the best option for flat surfaces like textile or plastic sheets.



SDBD fluidised bed



SDBD flatbed

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