ETP Corona Discharge Wand

Standard Operating Procedure

Faculty Supervisor: Prof. Robert White, Mechanical Engineering (x72210)
Safety Office: Peter Nowak x73246 (Just dial this directly on any campus phone.)
(617)627-3246 (From off-campus or from a cell phone)
Tufts Emergency Medical Services are at x66911.

Revised: May 20, 2015

Purpose: Many surfaces require modification before processing. For example, PDMS-glass bonding generally requires some sort of plasma treatment to achieve good adhesion. The corona discharge wand will change surface properties in much the same way as an aforementioned plasma treatment. It is useful for;

- PDMS-glass bonding
- Modifying hydrophobic glass surfaces to make then hydrophilic.

We will add uses as we discover them. Note that the surface modifications are temporary. The new properties will dissipate over the course of, typically, several minutes.

1.0 Material Requirements:

1.1 Equipment: wafer tweezers, discharge wand
1.2 Substrates: For corona treatment
1.3 Personal Protective Equipment: safety glasses, nitrile gloves

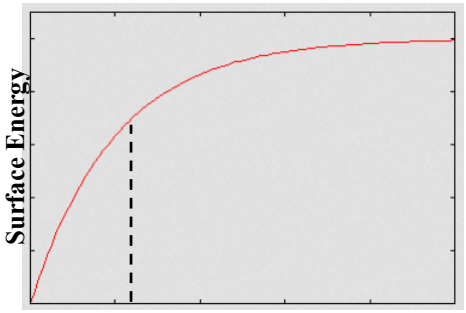
2.0 Procedure:

2.1 Corona Surface Treatment

The following guidelines will help determine the optimal settings. Results will depend on –

2.1.1 Treatment time

In nearly all applications time is the most important parameter. The surface effect, as measured by the increase in surface energy, is an exponential function (see graph). Most of the effect occurs quickly, the characteristic time, t*, is defined by power, electrode size, etc. For a glass slide sized area, try a treatment time of 20s. Increase or reduce as necessary. For other substrates, 2x the area should require twice the time, all else equal. Again, adjust time as necessary.



2.1.2 Power

The control knob at the end of handle adjusts the power. Start with the electrode tip 1/8" – ¼" from the substrate, adjust the power up (power adjustment knob CCW) until sparking occurs, then adjust down slightly. The power x time is constant for all applications. In other words, reducing the power by half will double the amount of time to produce the same treatment, all else being constant. A mid-range setting is recommended.

2.1.3 Distance

Typically the most efficient treatment will occur at a distance of 1/8" to ¼" . If you notice frequent discharges from the electrode to the surface (sparking) increase the distance (or decrease power). The minimum distance that does not exhibit excessive sparking is ideal. Treatment can be accomplished up to two inches but will take a longer time.

2.1.4 Electrode

The electrode size and shape can affect the treatment. Two electrodes are available. The circular electrode is best for flat surfaces, the field effect electrode for irregular surfaces.

3.0 Hazards

3.1 Sparks

The instrument emits a high frequency, high voltage spark. Do not operate near flammable liquids or gases as a spark may ignite them. Keep

the electrode tip away from the body. Extra precaution when wearing rings or jewelry (in other words, metals) is required.

3.2 Ozone

In operation, the electrode will ionize oxygen thus generating ozone gas. You may notice a pungent smell. In a well ventilated area this does not pose a problem. Do not operate in a confined space.

3.3 Radio Frequency Output

The instrument generates radio frequency output. Users who wear a pace maker or other medical electronic devices should consult a physician before use

4.0 Please return the unit to its storage spot when you have finished

If at any time you feel a situation is dangerous, do not hesitate to call the safety office (x73246, Peter Nowak) the faculty supervisor/lab manager (x72210, Robert White), or Tufts Emergency Services (Police/Fire/Ambulance at x66911).