

Static Electricity

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TECHNICAL INFORMATION

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Static electricity makes your hairs stand on end

What is static electricity?

“Static Electricity ... is the imbalance of positive and negative charges”

Static electricity refers to the accumulation of excess electric charge in a region with poor electrical conductivity, such that the charge accumulation persists.

“To understand static electricity, we have to learn a bit about the nature of matter”

made of different combination of these atoms.

In the middle of each atom is a nucleus. The nucleus contains two kind of tiny particles, called protons and neutrons. Orbiting around the nucleus are even smaller particles called electrons.

The protons and neutrons in the nucleus are held together very tightly. Normally the nucleus does not change. But some of the outer electrons are held very loosely. They can move from one atom to another.

An atom that loses electrons has more positive charges (protons) than negative charges (electrons). It is positively charged. An atom that gains electrons has more negative than positive particles. It has a negative charge. A charged atom is called an “ion”.

Cause of static electricity

Electrons can be exchanged between materials on contact. Materials with

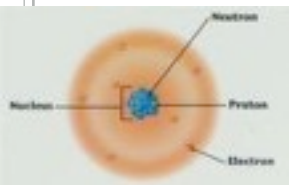
*You walk across the rug,
reach for the doorknob*

ZAP!!!

You get a static shock.

weakly bound electrons tend to lose them, while materials with sparsely filled outer shells tend to gain them. This is known as the **triboelectric effect** (Figure 1) and results in one material becoming positively charged and the other negatively charged.

The polarity and strength of the charge on a materials once they are separated depends on their relative positions in the triboelectric series. This is the main cause of static electricity as observed in every day life.



A t o m

Everything around us is made of atoms.

There are 115 different kind of atoms identified by the scientists so far. Everything you see is

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CERAMIC COATING

*Your Vision ...
Our Goal*



The keys are at CeraSOL

Come to visit our sales engineers for a solution that makes your products even better.



Triboelectric series

Most positively charged (+)

- Human skin
- Leather
- Rabbit's fur
- Glass
- Quartz
- Mica
- Human hair
- Nylon
- Wool
- Lead
- Cat's fur
- Silk
- Aluminum
- Paper
- Cotton

Neutral

- Steel
- Wood
- Lucite
- Amber
- Sealing wax
- Acrylic
- Polystyrene
- Rubber balloon
- Resins
- Hard rubber
- Nickel, Copper
- Sulfur
- Brass, Silver
- Gold, Platinum
- Acetate, Rayon
- Synthetic rubber
- Polyester
- Styrene (Styrofoam)
- Orlon
- Plastic wrap
- Polyurethane
- Polyethylene
- Polypropylene
- Vinyl (PVC)
- Silicon
- Teflon
- Silicone rubber
- Ebonite

Most negatively charged (-)

Figure 1



Static electricity in our everyday life



“When two non-conducting materials are rubbed or be in contact with each other, a charge imbalance will occur after the two materials are separated”

Triboelectric effect

A material towards the bottom of the series, when touched to a material near the top of the series, will attain a more negative charge, and vice versa. The further away two materials are from each other on the series, the greater the charge transferred.

Opposites attract

Two materials with opposite, or different charges (a positive and a negative) will attract, or pull towards each other. Things with the same charge (two positives or two negatives) will repel, or push away from each other. (Figure 2)

What does all this have to do with our everyday life? When you take off your wool hat, it rubs against your hair. Electrons move from your hair to the hat. A static charge builds up and now each of the hairs has the same positive

charge. Things with the same charge repel each other. So the hairs try to get as far from each other as possible. The farthest they can get is by standing up and away from the others. And that is how static electricity causes a bad hair day!

“tribos” means “rubbing” in the Greek



Another example is as you walk across a carpet, electrons move from the rug to you. Now you have extra electrons and a negative static charge. Touch a door knob and ZAP! The door knob is a conductor. The electrons jump from you to the knob, and you feel the static shock.

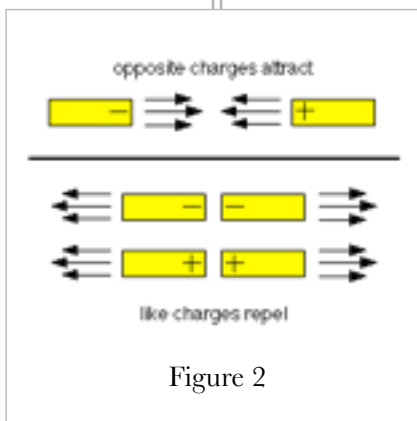


Figure 2



How does **CeraSOL** help reduce static electricity?

Presently, most hair brush, hair straightener and steam iron are made in or coated with plastic materials such as Teflon. As you can check from the Triboelectric series, Teflon and various plastic materials are in the bottom of the series, which means they are apt to “capture” electrons from your hair and clothes when they are in contact. As a result, static electricity is built up. Your hair will stand on end, and your clothes have problems of cling and sparking during ironing.

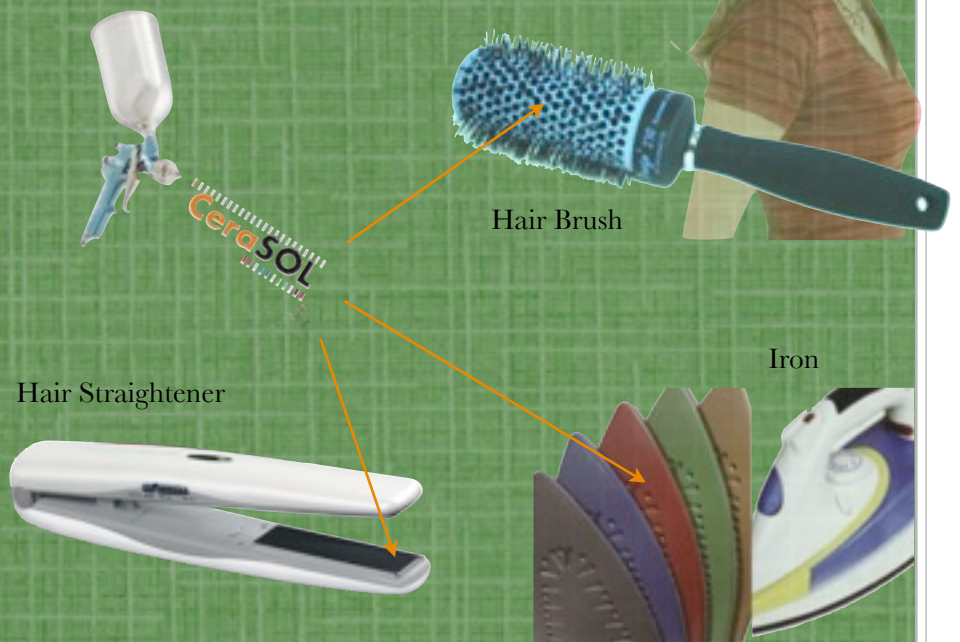
CeraSOL ceramic coating reduces the static electricity effect by effective emission of negative ion. The continuous supply of negative ion neutralizes the positively charged hairs created through brushing or rubbing.

CeraSOL also reduces noises of sparking during ironing. Spark is the result of an electrical discharge of the build-up static electricity created when the Teflon-coated soleplate rubs against the clothes.

Furthermore, CeraSOL ceramic coating is ranked in the upper triboelectric series, which means it will not attain as much electrons from hairs or clothes as Teflon or any other resin-based coating. Thus, less static electricity is built up.

CeraSOL

introducing negative ion into ...



TEST ITEMS

NEGATIVE ION AMOUNT UNIT

| TEST ITEMS | NEGATIVE ION AMOUNT | UNIT |
|--------------------------------------|---------------------|------------|
| Straightener Plate (42 x 83 mm) | 500 - 700 | ion per cc |
| Brush & Curling Tong | 800 - 1200 | ion per cc |
| Steam Iron Soleplates (120 x 140 mm) | 900 - 1200 | ion per cc |

Test Method: KFIA -FI-1042

The above data were measured at condition of temperature 26°C and humidity 34%

Tourmaline



Tourmaline crystal

“Tourmaline is a crystal silicate mineral that works perfectly with CeraSOL inorganic coating to generate negative ions.”

The Magic of **CeraSOL**

“CeraSOL ceramic coating system shows much better negative ion emission efficiency due to its micro-pores structure.” said Mr. S.M. Kim, top ceramic expert from Korea.

CeraSOL ceramic structure contains numerous micro pores (from 2.5 to 50 nanometers).

Kim explained “From the principle of negative ion emission, excessive electrons from tourmaline must interact with the water molecules from the air to generate negative ion. The most important variables for this movement is

the mobility of electrons and water molecules.”



Mr. S.M. Kim

“CeraSOL unique structure provides effective diffusion media for water molecules to come into contact with tourmaline to generate negative ion on continuous basis. Traditional resin-based coating system has very dense structure that virtually blocks tourmaline from reacting with water molecules” added Kim