

New plasma device for chemical-free cleaning and sanitizing of textiles

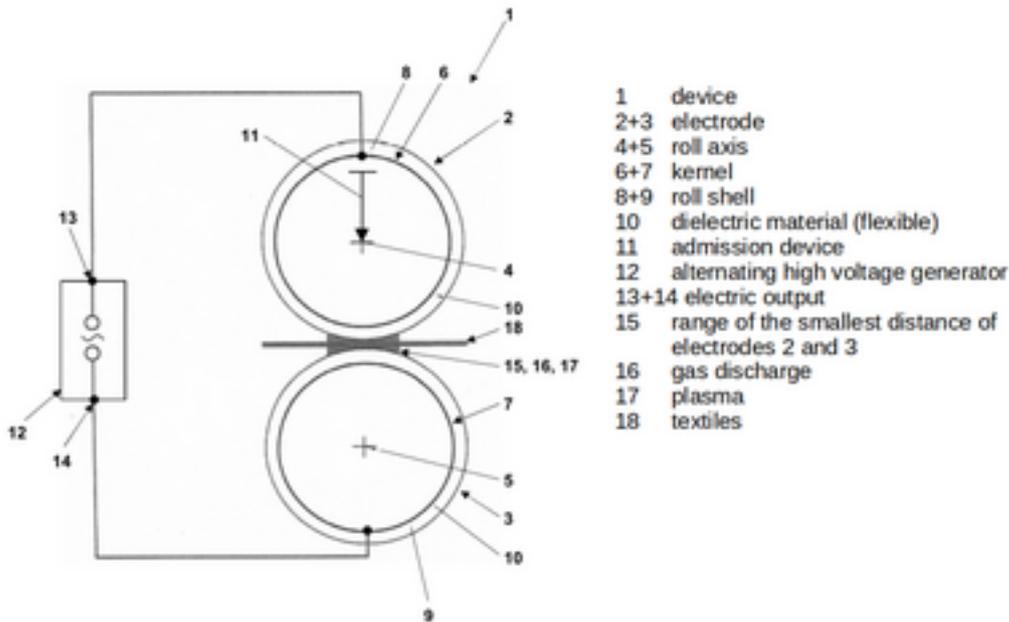
Scientists at the HAWK in Göttingen, Germany developed a new plasma device for chemical-free cleaning and sanitizing of textiles or clothes. The invention is particularly suitable for temperature- and chemical-sensitive textiles, which contain synthetic fibers (e.g. sportswear or medical fabrics). In addition, the plasma device can greatly reduce or eliminate odors.

Challenge

In today's modern world a lot of our clothes are made of special and functionalized fabrics, in particular sportswear but also modern suits or medical garments. They can be either washed only at low temperatures or – if indicated - can be dry cleaned (by chemical means). However, using low washing temperature will create microbial load resulting in musty smell and odors. Dry cleaning on the other hand will create further chemical waste and is thus critical in terms of environmental sustainability. There is a clear need for a chemical-free cleaning and sanitizing of temperature- and chemical-sensitive textiles.

Our Solution

Our scientists at the HAWK in Göttingen, Germany developed a device which enables the chemical-free cleaning of textiles by means of an atmospheric pressure plasma treatment. The device consists of two rollers coated with a flexible dielectric material (e.g. rubber, silicone) which serve as electrodes for plasma treatment. The plasma generated between the rollers transports the textile to be cleaned and sanitized. The plasma is generated in a narrow area around the two opposing rollers, but also in the textile itself. The rollers are pressed against each other with the aid of springs, pneumatics or weight force so that the rollers are always in contact with the textiles to be treated. This is further reinforced by a flexible dielectric so that irregularities such as buttons or zippers in the material or garment can be compensated. The pressure on the opposite roll is chosen so high that the dielectric deforms. In this way, garments can be completely treated with plasma. The rollers can be additionally heated during the plasma treatment to reduce the production of ozone. The temperature is monitored by a sensor and controlled by a controller. Preferably the temperature is 30°C - 40°C. The invented device is operated like a finisher, so that the garment is dried, disinfected and ironed at the same time. Odors can also be greatly reduced or eliminated with this plasma device.



Schematic drawing of the plasma device (a first embodiment). Source: DE102019110814.4.

Advantages

- chemical-free cleaning and sanitizing of temperature-sensitive textiles
- effective removal of smell and odors in clothes
- plasma as an alternative but effective physical cleaning and sanitizing method
- uses cold atmospheric plasma - excitation frequency of the high-voltage source is non-hazardous
- improves environmental sustainability

Applications

The invention is suitable for cleaning and sanitizing temperature- and chemical-sensitive textiles. Such cleaning is particularly suitable for sportswear or medical fabrics (e.g. thrombosis stockings) which contain synthetic fibers. These can be disinfected after washing and the microbial load can be reduced by a short treatment before or after wearing. Moreover, this short treatment reduces not only the germs but also the odor. This allows the use as a refresher e.g. in hotels or cleaning facilities. The clothes will be refreshed and ironed at the same time.

Applications in industrial cleaning of fabric or clothing, hotel services or at home for everyday clothings, especially sportswear.

Development Status

First plasma devices have been successfully tested at laboratory scale.

Patent Status

We have filed a priority patent application (applicant: HAWK University of Applied Sciences and Art Hildesheim, Holzminden, Göttingen).

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