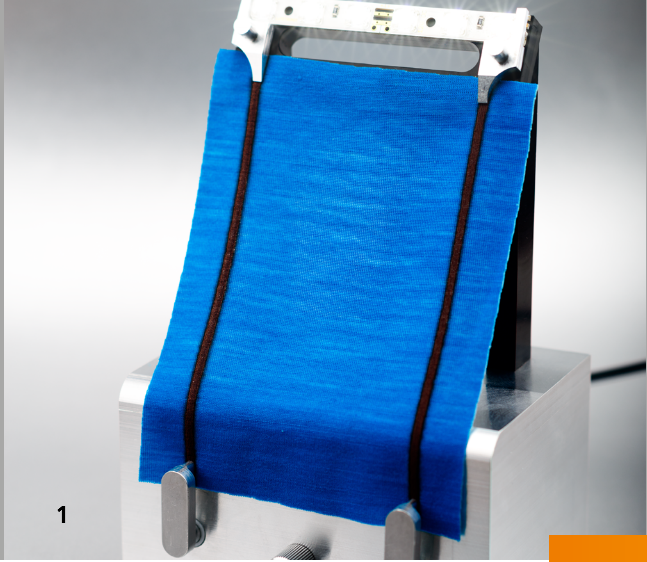

Extract from the annual report 2015
To the website: www.ist.fraunhofer.de/en.html

APPLIED COLD PLASMA SPRAYING

As well as direct contact with human skin, indirect contact to others via doorknobs can lead to a transmission of diseases. In particular in hospitals and with the dangers of multi resistant germs (MRSA) in mind, avoiding such sources of infection is extremely important. Because of their antibacterial properties copper doorknobs are considered a good solution. The disadvantage is that they are expensive and, therefore, are frequently stolen. At the Application Center for Plasma and Photonics at the Fraunhofer IST, a method for coating common metal or plastic doorknobs with an antibacterial copper layer has been developed called cold plasma spraying. This method allows the deposition of a copper coating of 100 µm – the minimal layer thickness to ensure a permanent antibacterial effect in everyday use.

The technology

Cold plasma spraying enables the efficient production of layers based on different metals, metal alloys and thermoplastics. The technology was developed in connection with thermal plasma spraying, where particles are melted or fused with the help of plasma, and sprayed on to a substrate. The huge advantage of cold plasma spraying lies in the use of comparatively small particles – the micro particles used are not bigger than 20 µm, or they have a high aspect ratio of thickness to width, which supports the fusing. Therefore, the whole melting process can be executed in considerably lower temperatures, allowing the coating of temperature sensitive materials such as plastics, thin glasses, paper or textiles.

The advantages

Compared to conventional coating processes such as Galvano technology, plasma cold spraying shows a number of advantages. Wet-chemical processes and environmentally unfriendly binding agents or solvents can be left out during the coating processes. Possible coating materials range from various metals like copper, aluminum, tin and titan to refractory metals such as wolfram, to name but a few. Furthermore, plastic coatings can be generated with PTFE or Polyethylene as basis material. The real strong point of the process is in the wide range of possible substrates: from very smooth surfaces like glass, and thermal sensitive materials such as paper, wood or textiles, up to complex three-dimensional materials made of synthetics or metal.

Fraunhofer Institute for Surface Engineering and Thin Films IST | Bienroder Weg 54 E | 38108 Braunschweig | Germany

Application examples

Due to the versatility of the process, its operational purposes are numerous. As well as the antibacterial coated doorknobs mentioned above, typical applications are mostly found in the fields of electronics. Here, thin copper conductor tracks can be deposited onto polymers, which can be used as smart phone antennae after a subsequent laser structuring. A further step can even allow the seamless integration of flexible conductor tracks on textile fabrics without damaging a single fiber.

Other application examples are:

- Conductor tracks
- Anti-static coatings
- Coatings to shield electro-magnetic interference radiation
- Heat conductive layers
- Friction coefficient reduction
- Anti-microbial functional layers
- Coatings as bonding agents
- Anti-adhesive layers
- Barrier layers
- Optical coatings

1 *LED-contacting via flexible conductor tracks on a textile fabric.*

.

2 *Anti-bacterial doorknob with a copper coating.*

CONTACT

Nils Mainusch
Phone +49 551 3705-333
nils.mainusch@ist.fraunhofer.de

Prof. Dr. Wolfgang Viöl
Phone +49 551 3705-218
wolfgang.vioel@ist.fraunhofer.de

Fraunhofer Institute for Surface Engineering and Thin Films IST | Bienroder Weg 54 E | 38108 Braunschweig | Germany