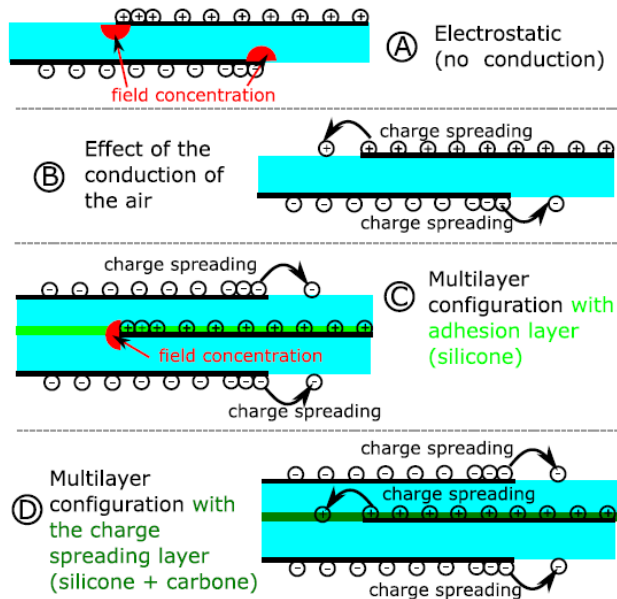


# Field Concentration Smoothing



Schematic of the charges' spreading layer

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Keywords	Electrical breakdown, Field concentration, Dielectric Elastomer actuator, Electric field smoothing
Intellectual Property	PCT/IB2020/060228
Publications	Towards the material limit and field concentration smoothing in multilayer dielectric elastomer actuators, Smart Materials And Structures 29 (2020) 045044. <a href="https://doi.org/10.1088/1361-665X/ab72e7">10.1088/1361-665X/ab72e7</a>
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## Description

Due to their versatile properties, high energy density and large actuation strain, dielectric elastomer actuators (DEAs) have become a cutting-edge technology for advanced robotics and smart prosthetics. Performance of dielectric elastomer actuators is closely related to its breakdown field. On the other hand, to enhance the available energy, multilayer configuration is needed to increase the amount of active material. However, multilayer configuration suffers from a drastic reduction of the affordable electric field related to field concentration at edges. After showing how the conductivity of the air helps to smooth the field in a single layer configuration, this effect has been mimicked in the multilayer by adding carbon particles in a thin silicone layer around the electrode. A change in the electric properties around the edges reduces the local concentration of the electric field and allows a significant improvement of the

voltage breakdown in the multilayer structure. Therefore, the performance of multilayer has been considerably enhanced.

## Advantages

The performance of the multilayer DEA, being now close to the one achieved in the single layer structure, one has the capability to add as many layers as one needs to fit the force and the output power required for any applications without decreasing the energy density of the actuator. This patent paves the way of the commercialization of efficient DEAs based efficient product.

## Applications

- Soft robotics
- Smart prosthetics
- Spatial applications