

Experiment Instruction: Dielectric Elastomer Actuators

Principles:

Please see https://en.wikipedia.org/wiki/Dielectric_elastomers for details.

Preparation:

The fabrication process of the dielectric elastomer actuator needs the following items shown in figure 1:

- **Two ring brackets** with inner diameters of 2 or 3 cm for holding the VHB tape.
- One piece of **VHB tape** working as the dielectric elastomer.
- **Copper tape** for connecting the actuator to the power supply.
- **Carbon conductive grease** as the electrode material.
- **Brush** for manipulating the carbon conductive grease.



Figure 1. Items for fabrication of dielectric elastomer actuators

Steps:

1. Peel off the liner of the VHB tape. Stretch the tape strongly and cover it onto one ring bracket. Fix the tape using another ring bracket like figure 2 showing (Clips may help fix the tape).

Note: the stretching process is necessary. If you don't stretch the VHB tape, you may not observe a clear actuation later due to the too thick VHB tape.

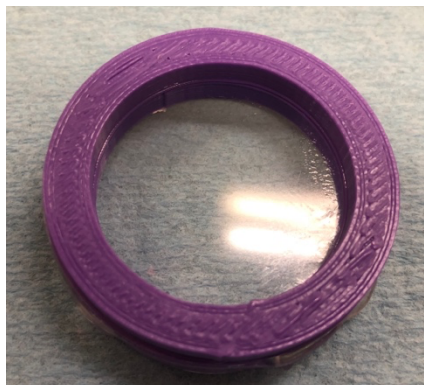


Figure 2. Fixing the VHB tape onto the ring brackets

2. As shown in figure 3, attach the copper tape on both sides of the VHB tape separately.



Figure 3. attaching copper tapes

3. Cast the carbon conductive grease on both sides of the VHB tape as figure 4 shows. You can use some masks if you want some complex patterns.

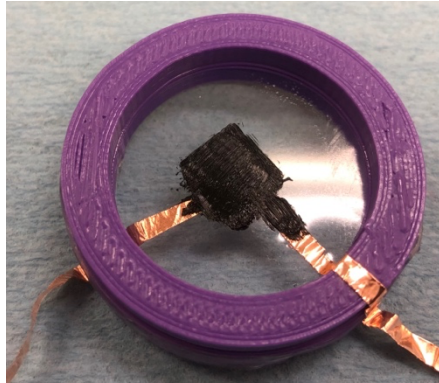


Figure 4. Cast the carbon conductive grease

4. Connect the copper tape to the power supply with a voltage of 2 kV – 3kV. The power supply is shown in figure 5.



Figure 5. Power supply

5. If you follow the instruction properly, you will see the actuation shown this video:
<https://www.youtube.com/shorts/jpf4ft0w-0Q>