

Fabrication of Wearable Triboelectric Nanogenerators

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Abstract An efficient way to create smart textiles is to fabricate the electronic devices directly on the fabric.^[1] This can be done by coating the fibre with graphene to make conductive textile fibres^[2]. Here we discuss the fabrication of a single electrode triboelectric nanogenerator (SE-TENG) made from a graphene electrode.

Graphene production

Water based graphene solution is made by exfoliation of graphite powder by shear forces and suspended with the help of a surfactant.

Transfer onto flexible substrates

Isopropanol (IPA) assisted direct transfer (IDT)

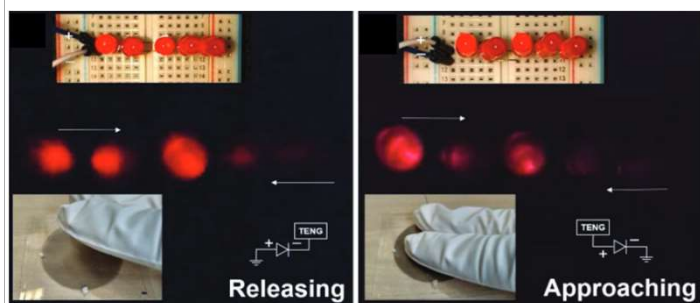
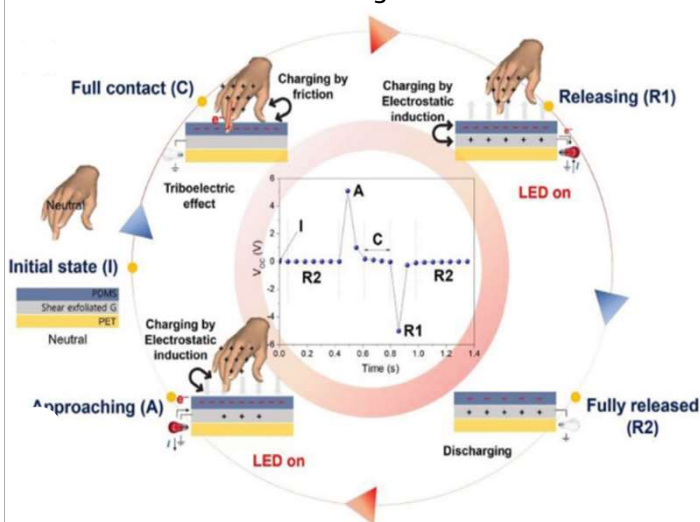
Evaporation
Detachment of membrane



Spray coating graphene solution onto the substrates using an ultrasonic nozzle.

Triboelectric nanogenerator

Graphene on a PET substrate functions as the electrode. This is combined with a PDMS active layer to form the SE-TENG which can generate electricity from motion of a human finger

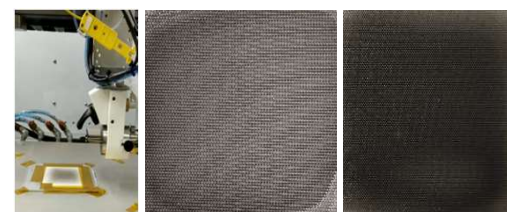


Towards wearables

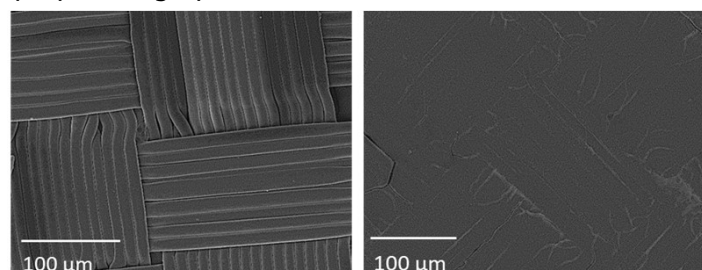
Graphene coating on fibres by IDT



Graphene coating on fabric by spray coat



Spray coating nylon fabric



References

- [1] Alonso, E.T. et al. Npj Flexible Electronics, 2(1), 25
- [2] Neves, A. I. S. et al. Sci. Rep. 5, 9866
- [3] Shin, D. W. et al. Adv.Mater. 30, 1802953