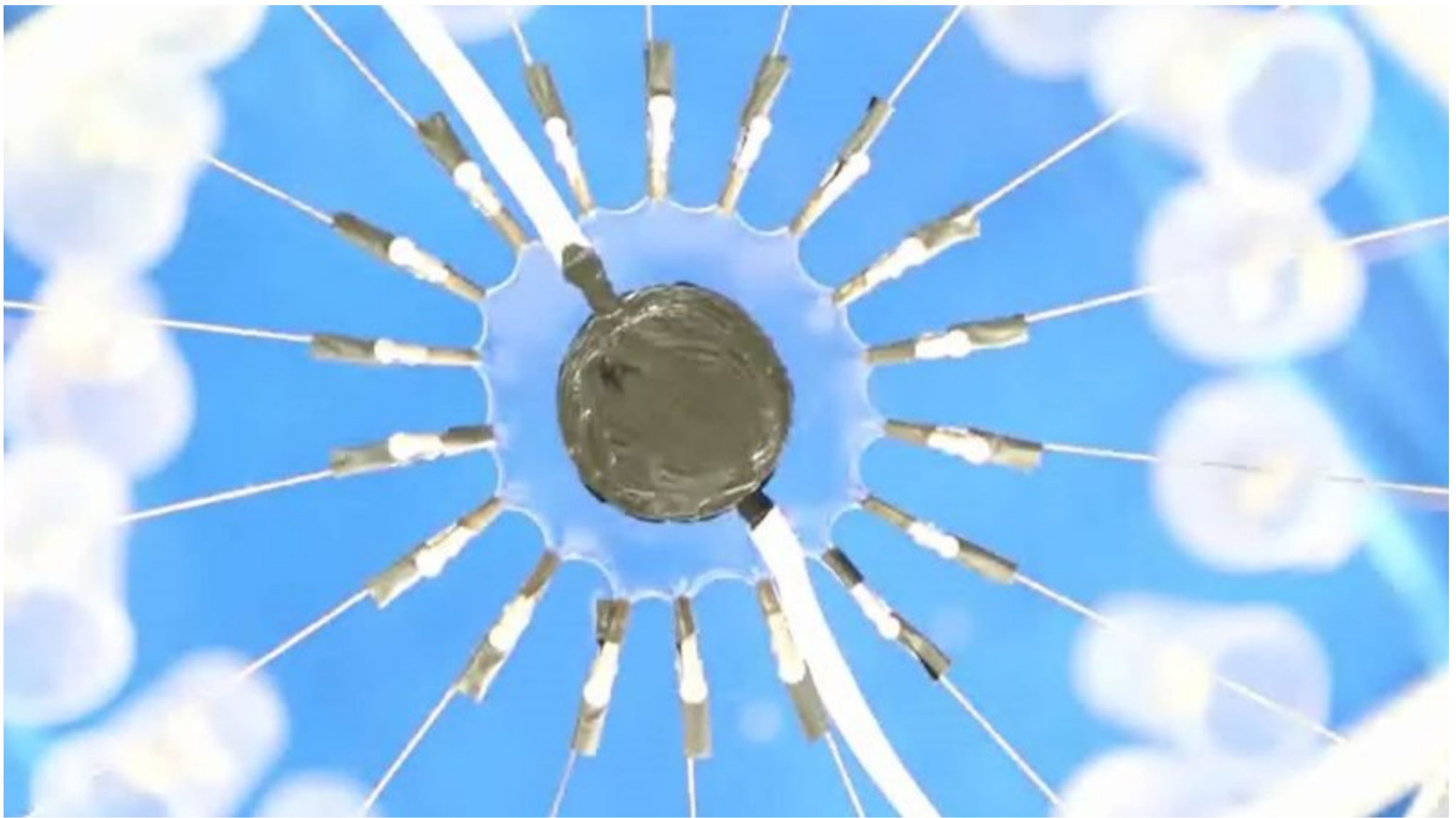


# 'Bat Cape' step closer after NUI Galway research

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Voltage administered to soft membranes that deploy and stiffen before they break

The reality of a Batman style "Bat Cape" could be a little closer after a team of applied mathematicians at NUI Galway cracked a formula of significant benefit to material scientists.

The researchers have discovered the level of voltage that can be administered to soft membranes that deploy and stiffen, before they break.

These dielectrics are the sort of substances depicted in the Batman movie, *Batman Begins*, where they enable a large cape to emerge from a tiny piece of material.

Similar genuine light and soft materials are being developed around the world for use in smart clothing, artificial muscles, soft robotics and energy harvesters.

They work by becoming hard and expanding when a high voltage is passed through them, but until now scientists had been unable to figure out exactly how much voltage such materials could handle before failing.

"Some are a millimetre thick, but if they thin out too much when they stretch with the voltage, it can lead to a short-circuit and a catastrophic breakdown," said Professor Michel Destradé, at the School of Mathematics, Statistics and Applied Mathematics in NUI Galway.

But the formula developed by the mathematicians in Galway, along with colleagues in Italy, has cracked the conundrum.

And while their work, published in *Physical Review Letters*, may not lead to Bat Capes hitting the market any time soon, it does mean the science fiction surrounding the area has taken a step closer to becoming science fact.

[Watch video of voltage administered to soft membranes that deploy and stiffen before they break](#)