Kirigami Nanocomposites with Improved Elasticity and Conductivity

*Technology #6621*

Tuning the mechanical and electrical properties of novel composite materials is one of the most challenging problems in materials science today. With the growing popularity of graphene and carbon nanotubes for use in electronics, much effort has gone into developing these technologies. Here, we disclose novel patterning techniques for graphene/PVA nano composites that allow for great enhancements in strain while maintaining the conductive properties of the material. This technique, based on ancient Japanese paper cutting art, allows for limitless tuning of strain properties that can easily be predicted by computational models.

**Fine Tuning Strain Properties in Next Generation Conductors**

By engineering small cuts into a thin nanocomposite material, we delocalize stress from small imperfections in the composite across the entire material, providing great improvements in strain performance. Moreover, engineering flexibility at the nano-scale allows for chemical bonds to remain unperturbed during strain events, maintaining stable conductivity across strain regimes up to 370%. These novel properties can be tuned to allow for use in many plasma or load bearing electronic applications.

**Applications**

- Flexible Conductors
- Flexible modulators of plasma discharge
- Displays
- Surface Coating

**Advantages**

- Large improvements in strain tolerance
- Conductivity maintained across large strain regimes

**Inventors**

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