(Two page abstract format: including figures and references. Please follow the model below.)

A novel class of strain gauges based on layered percolative films of 2D materials

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Abstract

Here we report on the fabrication and characterization of a novel type of strain gauge based on percolative networks of two-dimensional materials. The high sensitivity of the percolative carrier transport to strain induced morphology changes was exploited in strain sensors that can be produced from a wide variety of materials. Highly reliable and sensitive graphene-based thin film strain gauges were produced from solution processed graphene flakes by spray deposition. Control of the gauge sensitivity could be exerted through deposition-induced changes to the film morphology. This exceptional property was explained through modeling of the strain induced changes to the flake-flake overlap for different percolation networks. The ability to directly deposit strain gauges on complex-shaped and transparent surfaces was presented. The demonstrated scalable fabrication, superior sensitivity over conventional sensors, and unique properties of the described strain gauges have the potential to improve existing technology and open up new fields of applications for strain sensors.

References

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Figures