"Harvesting Friction to Shine a Light": Study on the Transparent & Flexible Triboelectric Energy Harvesting Device Using Bilayer Graphene

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1.3 billion people around the world live without access to “modern electricity.” Therefore, in these regions, the significance of small scale energy harvesting devices is increasing. This research used graphene, which has exceptional features of high transparency and flexibility and created bilayer graphene triboelectric nanogenerator (T.E.N.G) in order to further enhance efficiency. However, the issue is that currently, not only is there no confirmed optimal fabrication procedure to create graphene T.E.N.G, but creating multilayer graphene is very difficult in the first place. Therefore, this research merged two methods of graphene transfer together- a stable dry transfer method for the first layer and high-quality wet transfer for the second, to fabricate a bilayer graphene T.E.N.G that is both stable and high quality. Raman Spectroscopy was used to prove that the bilayer was successfully synthesized, and the nanogenerator showed that the transparency and flexibility of graphene were directly maintained all throughout the fabrication procedure used. Results showed that efficiency increased, with voltage from the bilayer being almost twice the voltage from monolayer graphene. This research serves as a fundamental stepping stone for further development of multilayer graphene sheets and to finding the optimal fabrication procedure for graphene T.E.N.Gs. There is also vast potential in which this nanogenerator could be used for application, as regions, where there are extremely low access to energy, are able to significantly benefit from such small-scale and labor-intensive energy harvesting device like the bilayer graphene T.E.N.G.