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The Utilization of HOPG based Graphene for a less costly and efficient replacement of platinum in Dye-Sensitized Solar Cells (DSC's)

MATTHEW P. PUSKO, Stephen F. Austin State University — Dye-Sensitized Solar Cells (DSC) are also known as Graetzel cells after their inventor, Michael Graetzel, who invented them in 1991. DSCs are potential alternatives to the more conventional and expensive semiconductor p-n junction solar cells like silicon solar cells. In a Graetzel cell, light is absorbed by a sensitizing dye which is coupled to a wide band gap semiconductor (TiO₂). Electric charges are liberated by the photon induced electron injection from the dye molecules into the conduction band of the semiconductor. The use of sensitizers in conjunction with the semiconductor oxide permits the absorption of a large portion of the terrestrial solar spectrum with near 10% conversion efficiency. In the “traditional” DSC, platinum metal is used as one of the counter electrode materials. In our research, graphene of various forms (from HOPG in specific) is utilized instead of costly platinum to replace the counter-electrode in the DSC's. HOPG also known as Higly Oriented Pyrolitic Graphite is being used to dry deposit graphene layers onto glass or FTO.

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