# Graphene-Based Solar Fuel Generator: Utilizing Sunlight and a Graphene-Based Solar Panel to Air Captured Convert Carbon Dioxide and Water Into Renewable Hydrocarbon Fuels Through a Catalytic Process

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Graphene Solar Fuel Generator (GSFG) is a new generation green fuel production technology based on advanced graphene-based solar technology to generate methane (CH4) from carbon dioxide (CO2) and water. GSFG aims to address growing demands for clean energy with reduced greenhouse gas emissions. The core device in GSFG is a graphene-based solar cell capable of efficiently utilizing sunlight as energy to power an electrolysis apparatus, breaking water (H2O) down into hydrogen gas (H2) and oxygen gas (O2). Hydrogen is then blended with CO2 captured within a catalytic reactor, in which solar concentrator heat stimulates the Sabatier reaction for the production of methane gas. The resulting methane can be pressurized within tanks and burned as a clean fuel for other uses. GSFG is significant as it is green, efficient, and scalable. Unlike traditional fossil fuel extraction methods, atmospheric CO2 is used here, lowering the carbon footprint while adding to carbon neutrality. As there is no dependency on solar electricity, no external power source is needed, thus making the system optimal for remote and off-grid sites. With its modularity, GSFG can be deployed from individual users to industrial scale. This project demonstrates the potential of graphene solar technology for attaining sustainable fuel production. CO2 utilization in the form of useful energy, GSFG provides a feasible path towards reducing fossil fuel dependency and global warming.

**Awards Won:**