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GRAPHENE-BASED LASER PROPULSION FOR SPACE APPLICATION

Abstract

Spacecrafts and satellites require propulsion systems for space navigation. Advancements in propulsion technology are crucial as space exploration expands. Photonic propulsion shows promise by overcoming limitations of conventional rocketry with advantages such as resilience to electromagnetic interference, efficiency, and low power consumption. Laser interactions with Graphene Based Materials (GBM) are of particular interest, specifically graphene sponges which are 3D connected graphene structures with densities ranging from $1-100g/cm^3$. They exhibit good electrical conductivity (up to 10 S/cm), adjustable pore sizes 1m, and ultralow density 0.16 mg/cm^3. Graphene sponges propel when subject to laser. Our study investigates the effect of different microstructures of graphene sponges on its performance for laser propulsion. Various microstructures are obtained by using different ink concentrations and directional freezing and freeze-drying techniques. Different parameters of laser system such as wavelength (450nm, 532nm and 650nm) and power densities (100mW to 1W) are investigated.