



Enabling Superior Raman Insight

Thermal Management Showcase



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Graphene-Enhanced Thermal Management

Danish Graphene is pioneering graphene enhanced thermal management solutions that are transforming passive cooling for the industry. Utilizing graphene's exceptional thermal conductivity, Danish Graphene has developed user-friendly solutions specifically for industry applications. The technology integrates effortlessly into existing systems, delivering an innovative approach to managing temperature in devices.

Danish Graphene's thermal management solutions are distinguished by their low density, high conductivity, minimal thermal resistance, and ultra-thin bond line thickness. These features not only prevent overheating but also unlock new possibilities for reimagining core systems.

"The use of **graphene-enhanced adhesive** was a **break-through** in our handheld miniRaman spectrometer design. It enabled us to achieve excellent thermal management together with mechanical stability, ensuring reliable operation of our powerful lasers within a very compact system. This innovation directly benefits our customers who rely on both durability and extended, hours-long Raman measurements, such as long-exposure Raman mapping with our portable microscope."

Konstantinos Stergiou,
Head of Engineering & Manufacturing, Lightnovo

Showcase



In compact handheld Raman spectrometers, high-power lasers generate significant heat, which can compromise optical alignment and reduce long-term performance. With limited space for heat dissipation, thermal management represents a key challenge in the design process.

By using a graphene-enhanced adhesive, the laser module was simultaneously secured and efficiently cooled. This approach ensures robust optical alignment and stable performance, even during prolonged measurements such as Raman mapping under a microscope.



The miniRaman spectrometer integrates a powerful laser in a compact optical system, where effective heat dissipation is critical to maintain stable, high performance operation. Conventional adhesives and thermal interface materials proved insufficient, either due to low thermal conductivity or the risk of electrical interference.

The graphene-enhanced adhesive offered the ideal balance between thermal management and electrical safety. It provided efficient heat dissipation from the laser while maintaining full electrical insulation, ensuring the laser operated without current leakage. At the same time, the adhesive delivered mechanical strength and stability, maintaining precise optical alignment through repeated thermal cycles and extended use.

This combination of thermal performance, insulation and mechanical robustness allowed the device to retain its accuracy and reliability even under demanding field conditions.

