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ABSTRACT TITLE:
Laser-welded Packaging of a Nd:YAG Laser for Space Applications

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ABSTRACT TEXT:
The success of interferometry in space depends on the development of lasers that can survive launch conditions and the space environment during missions that could last five years or more. This paper describes the fabrication of a rugged, laser-welded package for a 200mW, monolithic diode-pumped solid-state Nd:YAG laser operating at 1319nm. Environmental testing shows that the laser withstands non-operational thermal cycles over a temperature range from –20°C to 55°C, and 22.3 g-rms of random vibration, with little or no degradation of laser output power or performance. The novel packaging method employs a specially designed housing to which multi-mode or single-mode polarization-maintaining fiber pigtails can be aligned and laser-welded into place. To further enhance reliability, a redundant pumping system called the Multi-Fiber Pump Ferrule (MFPF) was developed and implemented. The MFPF allows multiple laser diode pump modules to be aligned to the laser crystal simultaneously, in order to accommodate either parallel or standby pump redundancy. This compact, lightweight design is well suited for space flight applications and the laser-welded technique can easily be adapted to many other fiber optic and electro-optic devices in which critical optical alignments must be maintained in a harsh environment.

KEY WORDS: Laser, Packaging, Laser-welded, Space,