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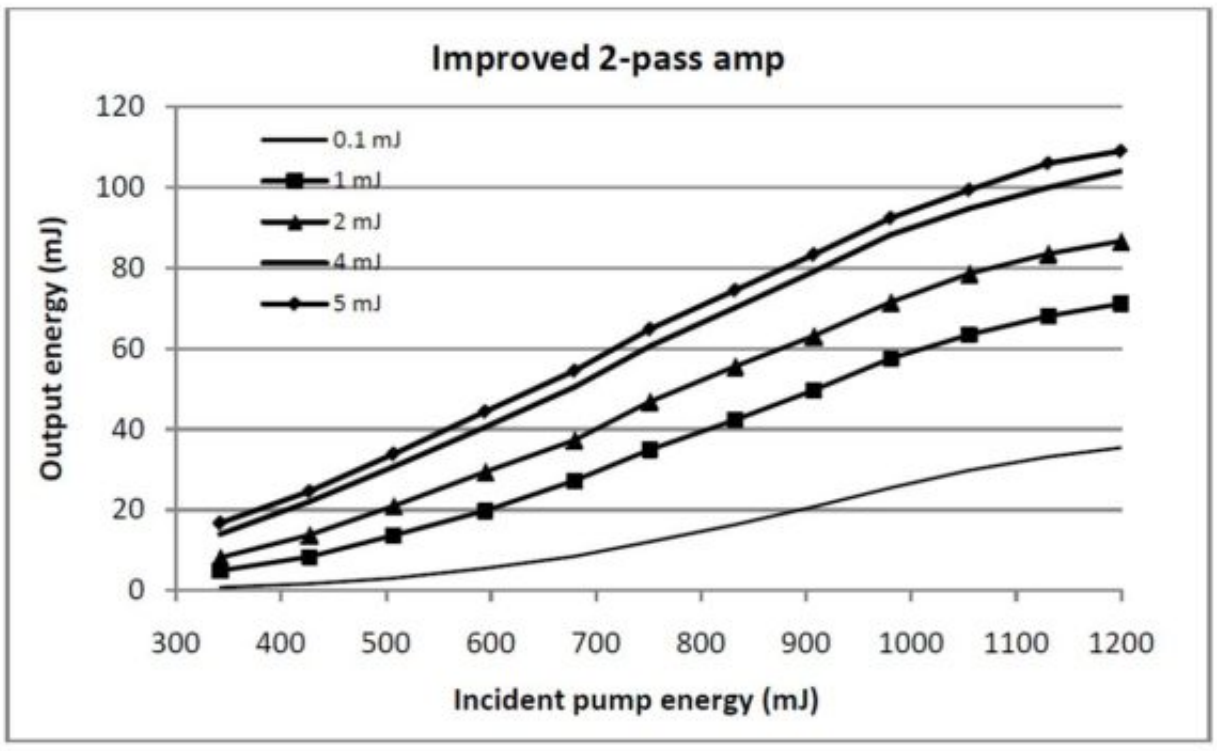
**JGM ASSOCIATES, INC.**

Ultra-compact solid-state lasers for next-gen handheld instruments



# High-Energy Mini-MOPAs ™






A Q-switched Nd:YAG laser oscillator (1064 nm) that generated 5 mJ in a 10 ns pulse was mated to a high-energy Nd:YAG VHGM amplifier. The amplifier employed an Nd:YAG slab with dimensions of 8 x 10 x 50 mm. The slab was pumped on two sides with two 15-bar laser diode arrays (30 bars total, no microlenses). The oscillator seed beam made two passes through the amplifier. A Faraday isolator was not used to separate the input seed beam from the 2-pass-amplified output beam (geometric separation). The figure below shows input-output efficiency of the two-pass amplifier for input seed energies from the oscillator of 0.1, 1, 2, 4, and 5 mJ.

At maximum pump energy in the amplifier (1.2 J), two-pass output energy was 115 mJ for 5 mJ seed energy, and 35 mJ for 100-150 uJ seed energy. Pulse rate was 10 Hz. Output beam quality was M2 = 2 to 2.5 whereas beam quality of the seed laser was M2 = 1.3. We expect that output beam quality of the 2-pass amplifier will improve with improved slab fabrication.

Future efforts will increase pulse rate and average power, improve beam quality, and mate the same amplifier to short-pulse microchip laser oscillators (0.5 to 1 ns, 50 to 100 ps). The objective will be to package the entire MOPA laser head into a 6" square footprint or smaller.

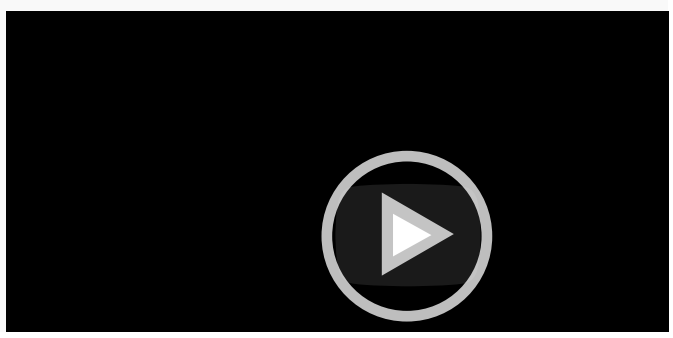
Such a compact high-energy MOPA could prove useful for applications such as laser-induced breakdown spectroscopy (LIBS), flash LIDAR, laser-assisted surface cleaning, precision paint removal, and dermatology applications such as tattoo removal.

## ABOUT

JGM Associates Inc. (JGMA; Mr. Jeffrey G. Manni, President) provides R&D and OEM manufacturing services intended to help clients develop, make, and sell laser-based

## SEARCH





products. JGMA specializes in the development of direct-diode and diode-pumped solid-state lasers, but also develops lamp-pumped solid-state lasers.

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