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A MICROLASER MADE OF LMA

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The microchip laser [1] is a very efficient and inexpensive way to convert the highly divergent and weakly coherent emission of a laser diode into a monomode, high coherence and low divergence beam. On the other hand LMA ($\text{LaMgAl}_{11}\text{O}_{19}$) doped with Neodymium is a laser material of choice : it can be doped to a level three to four times that of YAG and it presents wide fluorescence and absorption bands that make it tunable (1,05 - 1,08 μm) and rather insensitive to pump wavelength fluctuations. It was thus interesting to test LMA as a microchip material.

A 1 mm thick disk of LMA was laser grade polished and coated on both faces by suitable dielectric mirrors. It was then close coupled to the fiber output of a 300 mW laser diode which could be tuned to 798 nm. This device delivered up to 40 mW at 1,05 μm with a slope efficiency as high as 68 % as function of the absorbed power. The signal presented only one transverse mode and, at high pumping levels, seven longitudinal modes, with a free spectral interval of 2,8 cm^{-1} , as can be expected for a 1 mm long cavity. Near the threshold, this spectrum reduces to two longitudinal modes. It will probably be possible to obtain a single mode by decreasing the cavity length, i.e, the sample thickness.

Other characteristics of this device, such as its sensitivity to pump wavelength, its tunability and its beam shape and divergence are under study and will be presented.

[1] J.J Zayhowski and A. Mooradian, Opt. Lett. 14 (1989)