

Copper vapor laser

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Copper vapor laser (CVL) uses [vapors](#) of [copper](#) as the [lasing medium](#) in a 3-level laser. It produces green [laser light](#) at 510.6 nm and yellow laser light at 578.2 nm. The pulse width is typically from 5 to 60 ns, and [peak power](#) from 50 to 5000 kW. Its pulse repetition frequencies can be 2 to 100 kHz. The *average power* of CVLs can range from 25 W to more than 2 kW.^[1]

It is one of the lasers that can be home built.^[2]

Lasers using pure metal vapor produced from an elemental copper source are difficult to construct because of the extremely high temperature, about 1500 °C, necessary to create such vapor, severely limiting the materials for the vapor containment vessel and mirrors. Copper halides, specifically [copper chloride](#), [copper bromide](#) and [copper iodide](#), have been substituted since they form vapors at much lower temperatures, in the range 300 °C - 600 °C, but operation at such temperatures remains difficult. Copper compound vapors also increase the complexity of the pump signal applied to the device. Typically, two energizing pulses in quick succession are required, the first to dissociate vapor molecules, and the second to cause the dissociated ions to lase. [Operating temperature](#) can be further reduced by the use of [copper nitrate](#) or [copper acetylacetonate](#), whose vapors give peak laser output power at 180 °C and 40 °C, respectively.

Using singly ionized species of Cu, research has also demonstrated copper vapor lasers that are CW ([continuous-wave](#)), i.e., not pulsed, and lase at [deep ultraviolet](#) wavelengths.^{[3][4]} These lasers can provide average UV powers of several mW and are potentially useful for [analytical instruments](#) and [spectroscopy](#).

Copper vapor lasers are used in some [machining](#) and [laser cutting](#) applications. They can also be used in [AVLIS isotope separation](#) systems. In the AVLIS application the copper laser is used to excite tunable [dye lasers](#). A review on copper-laser-pumped dye lasers is given by [Webb](#) in *High Power Dye Lasers*.^[5]

Entertainment

Copper vapour lasers were first used outside of military use and for entertainment purposes by [Pink Floyd](#) on their 1994 tour, supporting their album, *[The Division Bell](#)*.