

Tunable laser frequency doubling device

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STAGE OF DEVELOPMENT

- Prototype system demonstrated in laboratory

INTELLECTUAL PROPERTY

Patent application filed

DESIRED PARTNERSHIPS

- License
- Sponsored Research

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Problem

Nonlinear materials are used in laser light sources to modify or enhance the properties of incoming light. One of these techniques, second harmonic generation, is used to generate new light sources at double the frequency of the incoming light. This technique can be used to generate light at frequencies for which there is no convenient laser source. However, most frequency doubling devices do not greatly enhance the intensity of the second harmonic. To produce more powerful second harmonic generation devices, new techniques are required.

Solution

A new resonant cavity device developed by researchers at the University of Pennsylvania can enhance the intensity of the second harmonic by more than 3,300 times as compared to a monolayer on a glass substrate. The new device consists of an adjustable resonant cavity that can change its shape via an electrostatically tunable membrane. The cavity size is tuned until both the fundamental wave and the second harmonic are both in resonance simultaneously, resulting in the enhanced output. Because the device is tunable, it can be used to enhance light at a variety of wavelengths.

Advantages

- 3330x enhancement of the second harmonic
- Tunable cavity can be used with a variety of desired wavelengths
- Use as a high intensity laser source for photonic or optical devices