Produce a Small Disk Laser Made of Multiple Diodes

The invention details the means, methods and apparatus for creating a multi laser diode array arranged on a washer shaped substrate. Methods for aligning the diode lasers with an active gain media are provided, as well as the means of cooling the array from the back surface.

High-powered lasers are used for numerous commercial and military applications, such as: etching, tool making, communications and missile defense. Typically, high-powered lasers are large, expensive and require large amounts of energy. Current research within the field is aimed at developing thin-disk lasers as small, inexpensive and high-powered alternatives to current lasers. A disk laser is comprised of several laser diodes focused onto an active gain media. This gain medium absorbs light from the laser diode and emits light of greater intensity. Current disk lasers make use of complex mirror arrays to redirect light and enhance absorption onto the gain medium. Unfortunately, these methods are complex, inefficient and fragile.

Technical Details

UCF engineers have developed a new method of aligning laser diodes for the creation of a small, more powerful and efficient disk laser. The disk laser makes use of multiple diode lasers arranged on a small washer shaped substrate. The arrangement of these diode lasers allows for greater uniformity and more efficient absorption of laser power. This diode laser array uses fewer optical elements (lenses/mirrors), is easy to adjust, compact (just a few centimeters), rugged and is capable of providing any required power output.

Benefits

• Compact, rugged solid state laser
• Easily scalable power output
• Simple manufacturing process and compatibility with existing laser technology
• Provides any required power output

Applications

• Provides high-power disk lasers for manufacturing applications and material processing, such as cutting, welding, and remote welding
• Defense industries, manufacturing companies, and military interest

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