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(54) **HIGH EFFICIENCY SOLID-STATE LIGHT SOURCE AND METHODS OF USE AND MANUFACTURE**

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See application file for complete search history.

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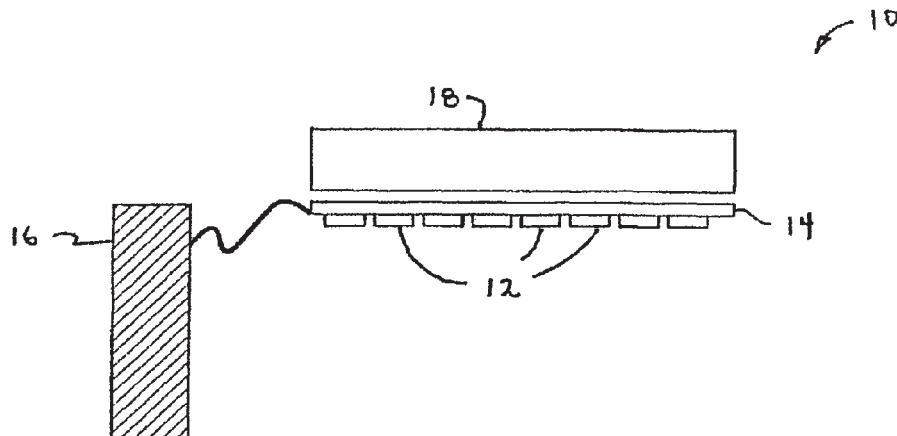
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(57) **ABSTRACT**

A high-intensity light source is formed by a micro array of a semiconductor light source such as a LEDs, laser diodes, or VCSEL placed densely on a liquid or gas cooled thermally conductive substrate. The semiconductor devices are typically attached by a joining process to electrically conductive patterns on the substrate, and driven by a microprocessor controlled power supply. An optic element is placed over the micro array to achieve improved directionality, intensity, and/or spectral purity of the output beam. The light module may be used for such processes as, for example, fluorescence, inspection and measurement, photopolymerization, ionization, sterilization, debris removal, and other photochemical processes.

9 Claims, 16 Drawing Sheets



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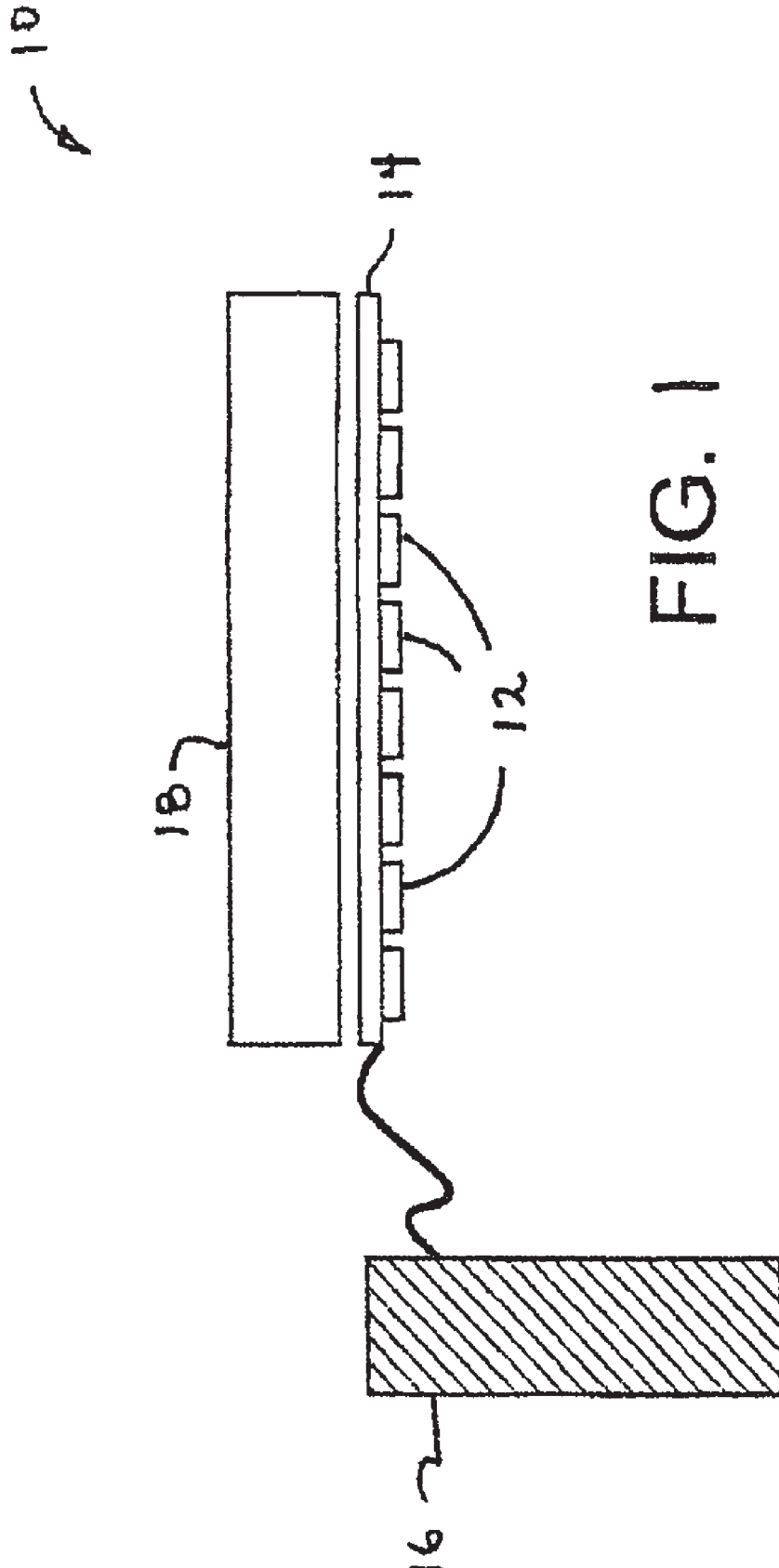
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