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(54) **SURFACE-EMITTING SEMICONDUCTOR
LASER BASED ON A TRIPLE-LATTICE
PHOTONIC CRYSTAL STRUCTURE**

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(57) **ABSTRACT**

A surface-emitting semiconductor laser based on a triple-lattice photonic crystal structure, including: a P-type electrode, a P-type contact layer, a P-type cladding layer, a photonic crystal layer, an active layer, an N-type cladding layer, an N-type contact layer, an N-type substrate, and an N-type electrode successively arranged from top to bottom. The photonic crystal layer has a triple-lattice photonic crystal structure, which is formed by a plurality of square unit cells arranged periodically. Each square unit cell includes three identical air holes, namely, a first air hole, a second air hole, and a third air hole. A distance between a center of the first air hole and a center of the second air hole is $(0.5 \pm 0.1)a$, and a distance between a center of the third air hole and the center of the second air hole is $(0.5 \pm 0.1)a$, where a is the lattice constant.

