

Abstract Submitted
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Improvement of Extraction Efficiency of LED with Surface Relief Nanostucture Fabricated by Self-Assembled Block Copolymer Pattern RYOTA KITAGAWA, AKIRA FUJIMOTO, KOJI ASAKAWA, Corporate Research & Development Center, Toshiba Corporation — A surface relief nanostucture was fabricated on the emission surface of light-emitting diodes (LEDs) using a self-assembled diblock copolymer pattern. The pattern of the nanostucture possesses moderate short-range order with slightly deviation in size and spacing, which is different from conventional extraction surface structures, such as photonic crystal and randomly textured surface. The dot pattern of a self-assembled polystyrene -polymethylmethacrylate diblock copolymer (PS-*b*-PMMA) was used as an etched mask. An average dot spacing was controlled by changing blend ratio of PS-*b*-PMMA, homo (h-) PS, and h-PMMA in a polymer solution. In the photoluminescence (PL) measurement, the light extraction efficiency of the nanostucture exceeded over twice, compared with a flat surface, by optimizing the average spacing of the nanostucture. It was also revealed that the nanostucture showed more than 10% higher extraction efficiency than the highly ordered nanostucture fabricated by a self-assembled nanosphere pattern. These results can be interpreted as a contribution of structural fluctuation in the nanostucture for enhancement of extraction efficiency.

Ryota Kitagawa
Corporate Research & Development Center, Toshiba Corporation

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