Characteristics of the Optical Film Arranged with Spherical Micro Lenses

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Optical film arranged with micro-sized lenses was produced to examine the viewing angle and brightness. The mold was produced by arranging spherical particles in the holes of silicon wafers etched at 20um and 110um diameters, respectively. The patterns of the molds were transcribed to polyurethane resin to produce the optical film arranged with the micro-lenses of respective sizes. The film with 20um diameter and 10um height lenses showed improvement of brightness by 17%, and the film with 110um diameter and 55um height lenses showed improvement of brightness by 26%, compared with flat film. The viewing angle of the film with 110um diameter lenses decreased slowly when measured from the perpendicular direction to 60 degrees in both sides. In the commercial dual-layered brightness enhancement film which was prism type showed 65% of brightness improvement and its viewing angle rapidly decreased at 30 degrees. The optical film with micro-lenses produced in laboratory scale is expected to provide excellent performance in brightness and viewing angle by optimizing lens arrangement and removing light scattering on the lens surface.