

ABSTRACT**PROJECTION OPTICAL SYSTEM, EXPOSURE SYSTEM, AND EXPOSURE METHOD**

5 A liquid immersion type projection optical system that can stably prevent the outflow of immersion liquid into inside of an optical system and can maintain good imaging performance. In the projection optical system of the present invention, an optical path between a light transmitting member (Lp) disposed closest to a second surface (W) side and the second surface is filled with a liquid (Lm1) having a refractive index greater than 1.1, and a light shielding film (36) for shielding the passing of light is formed on the side surfaces (41, 42) of the light transmitting member. When D is a space between the second surface and the light shielding film, Θ is a maximum incident angle of an image forming beam which reaches the second surface, and Ym is a maximum image height on the second surface, the condition of $0.25 < D/Y_m \times \tan\Theta < 1.7$ is satisfied.

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Figure 6