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A crystallization apparatus includes an illumination system (2) which illuminates a phase-shift mask (1) and an image-forming optical system (3) arranged in an optical path between the phase-shift mask and a semiconductor film (4). The semiconductor film is irradiated with a light beam having a light intensity distribution of inverted peak patterns whose light intensity is the lowest in portions corresponding to phase shift sections to form a crystallized semiconductor film. The illumination system has a light source which supplies a light beam of a give wavelength range. The image-forming optical system is located to optically conjugate the phase-shift mask and the semiconductor film and has an aberration corresponding to the given wavelength range to form a light intensity distribution of inverted peak patterns with no swell of intensity in the middle portion.