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ABSTRACT

A photolithography apparatus is constructed comprising an exposure light source that emits light with a wavelength of 400 nm or less as the exposure light, a reticle with a pattern original image formed therein, an illumination optical system that irradiates light outputted from the exposure light source onto the reticle, a projection optical system that projects the pattern image outputted from the reticle onto a photosensitive plate and an alignment system that positions the reticle and the photosensitive plate. At least some of the synthetic silica glass members composing the illumination optical system, the synthetic silica glass members composing the projection optical system and the reticle consist of synthetic silica glass members which, upon 1×10^4 pulse irradiation with an ArF excimer laser at an energy density from $0.1 \mu\text{J}/\text{cm}^2 \cdot \text{p}$ to $200 \text{ mJ}/\text{cm}^2 \cdot \text{p}$, have a loss factor of no greater than 0.0050 cm^{-1} at 193.4 nm measured after irradiation, a hydrogen molecule concentration of from $1 \times 10^{16} \text{ molecules}/\text{cm}^3$ to $2 \times 10^{18} \text{ molecules}/\text{cm}^3$ and a loss factor of no greater than 0.0020 cm^{-1} before ultraviolet irradiation.