

# **Design and optimization of silicon quantum dot antireflection coating performance for UV spectrum**

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## **a b s t r a c t**

In this study, the optical properties of silicon quantum dot as a function of particle size were calculated and investigated. The antireflection coating performance for the spectrum range of 300–400 nm was designed and optimized using MATLAB version 7.11. Results show that the reflectivity of surface decreases from 30.2% to 0.4003% when the size of bulk silicon particle decreases from 40 nm to 2.2 nm. Moreover, the reflectivity of the designed single layer (Air/Nano Si/Si bulk) is 0.2443% at the incident angle of  $0^\circ$  with wavelength of 350 nm and particle size of 2.6 nm. For the designed (Air/Nano Si/Al<sub>2</sub>O<sub>3</sub>), reflectivity is 1.3272% at the incident angle of  $0^\circ$  with wavelength of 350 nm and particle size of 2.4 nm. Silicon quantum dot is an excellent antireflection coating against incident light when compared with other antireflection coatings. This material also exhibits good light trapping of wide wavelength spectrum and can thus be used in producing high-efficiency .devices

*Keywords : Quantum dot , Reflectivity , Design , Coating , Silicon*

