

Copper ion-exchanged channel waveguides optimization for optical trapping

Abstract

Optical trapping of particles has become a powerful non-mechanical and non-destructive technique for precise particle positioning. The manipulation of particles in the evanescent field of a channel waveguide potentially allows for sorting and trapping of several particles and cells simultaneously. Channel waveguide designs can be further optimized to increase evanescent field prior to the fabrication process. This is crucial in order to make sure that the surface intensity is sufficient for optical trapping. Simulation configurations are explained in detail with specific simulation flow. Discussion on parameters optimization; physical geometry, optical polarization and wavelength is included in this paper. The effect of physical, optical parameters and beam spot size on evanescent field has been thoroughly discussed. These studies will continue toward the development of a novel copper ion-exchanged waveguide as a method of particle sorting, with biological cell propulsion studies presently underway.

Keywords

Beam propagation method; Channel waveguide; Optical manipulation