Tohoku Univ. and Tokyo Univ. Technology

Scanning control technology for designing desired laser intensity distributions

Precise design of scanning speeds and trajectories, contributing to enhanced microparticle control and improved fabrication accuracy

Overview

In conventional laser scanning control, it is difficult to accurately match an arbitrary target intensity distribution even when optimizing the temporal change of irradiation positions. This has imposed limits on the precision of microparticle control using optical tweezers and the resolution of drawing and fabrication. This invention overcomes these constraints by reverse-calculating and optimizing scan patterns from target distribution data. By precisely managing irradiation timing and intensity balance, it aligns actual laser intensities with ideal profiles, enabling high-precision microparticle manipulation, maskless lithography, and optical 3D printing. Leveraging this technology, inventors achieved the world's first experimental demonstration of particle transport with minimal thermodynamic dissipation, as predicted by mathematical "optimal transport theory". This breakthrough provides a foundation for next-generation ultra-low-power information processing and the design of precision nanomachines

Product Application

- ☐ Maskless exposure system
- ☐ Stereolithography (SLA) 3D printer
- ☐ Next-generation ultra-low-power computing device

IP Data

IP No.	:	JP 2026-36588 A
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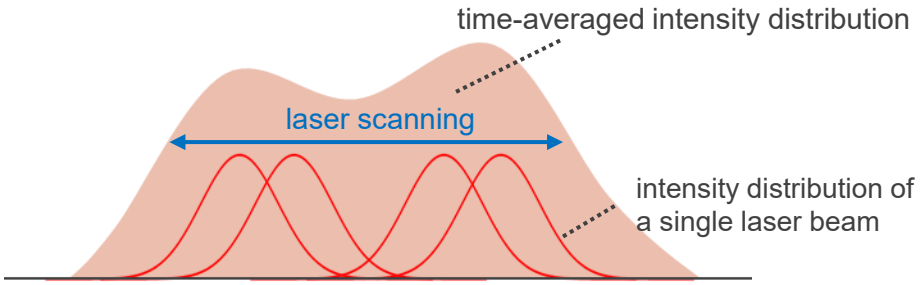
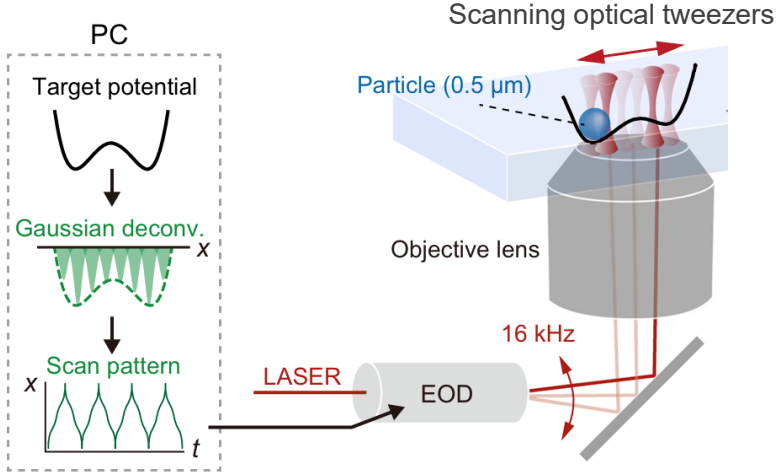
Admin No.	:	T24-044

Scanning a laser at high speed to create an arbitrary-shaped potential



・Algorithm for calculating scan patterns to realize arbitrary optical intensity distributions

・Successful creation of arbitrary-shaped potentials by laser scanning



Related Works

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