

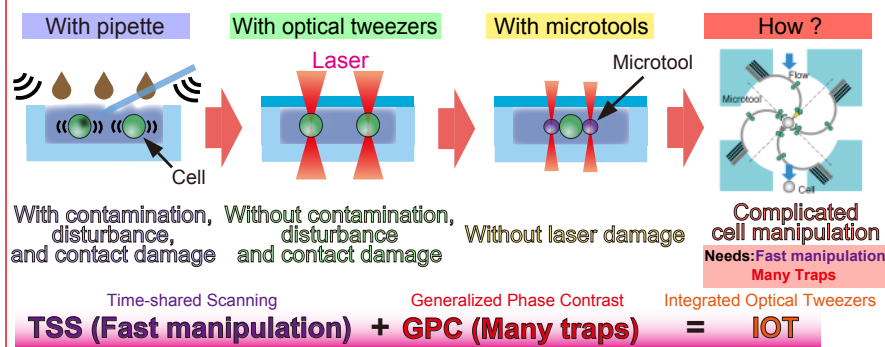
新しいレーザ操作の提案：マルチビームで捕捉し，高速に操作するには？

1. Abstract

For complicated manipulation of the cells, we developed Integrated Optical Tweezers(IOT) by using Time-shared Scanning method(TSS) for **high speed manipulation** and Generalized Phase Contrast method(GPC) for **trapping a lot**. And we fabricated **SU-8 microtools** which suit for the IOT with **photolithography** for productivity. At last, we made experiment system and confirmed the effectiveness.

2. Motivation

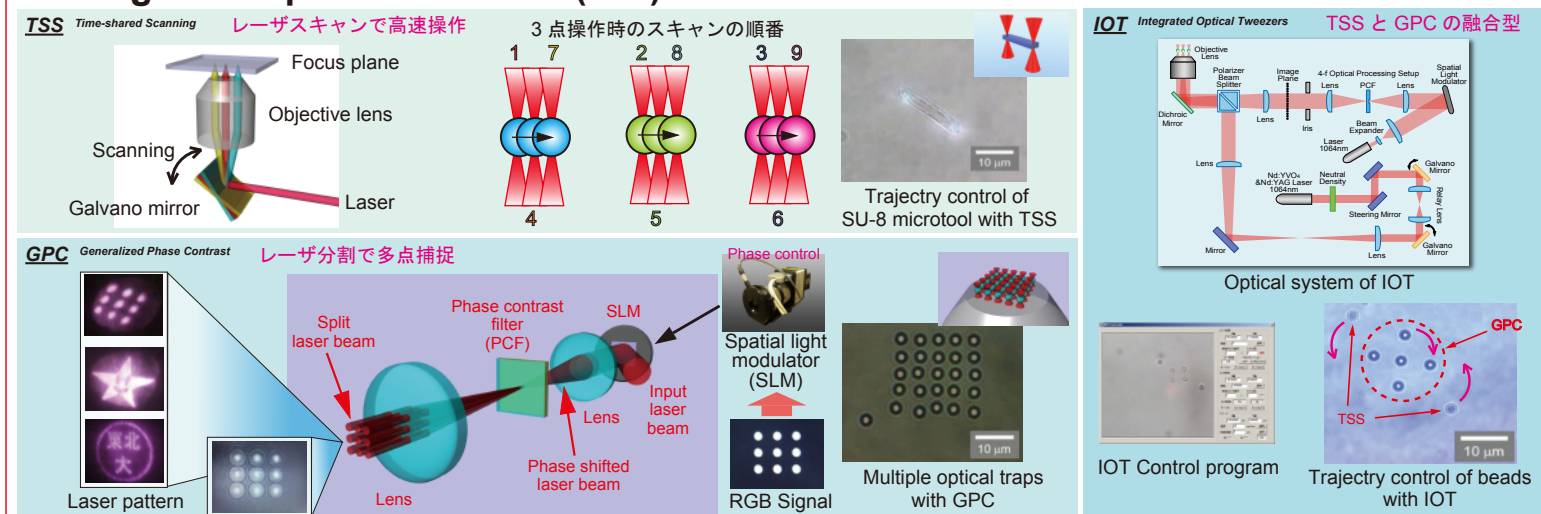
高速操作・多点捕捉のために



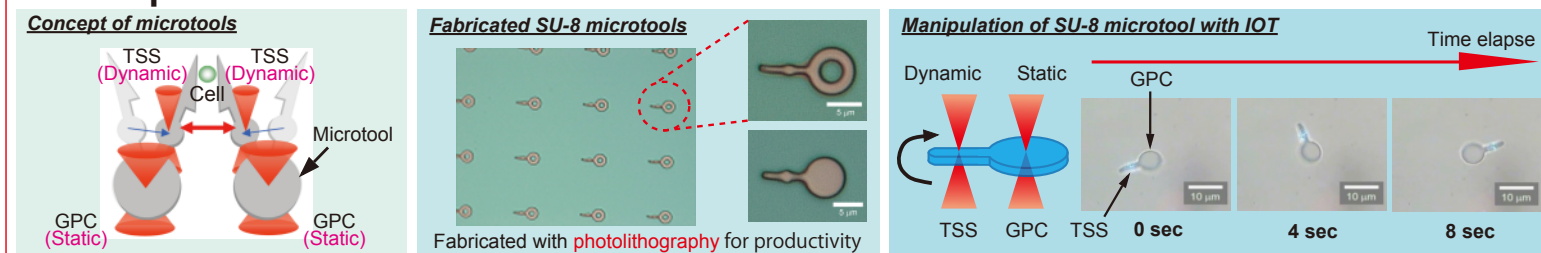
Comparison of laser manipulation

		Time-shared Scanning (TSS)	Generalized Phase Contrast (GPC)	Computer Generated Hologram (CGH)
2D Trajectory control	Small num.	Fast*	Slow**	Slow**
	Large num.	Slow*	Slow**	Slow**
3D Trajectory control	Small num.	Very Slow*	Slow**	Slow**
	Large num.	Not recommended*	Slow**	Slow**
Response speed	Small num.	Fast*	Slow**	Slow**
	Large num.	Slow*	Slow**	Slow**
Computation	Small num.	Simple	Simple	Complex
	Large num.	Complex	Simple	Complex
Stability	Small num.	Stable	Stable	Stable
	Large num.	Unstable	Stable	Stable
Laser power (Trap force)		Large	Weak**	Weak**
Hardware		Simple	Complex	Complex

3. Integrated Optical Tweezers (IOT)



4. Manipulation of SU-8 microtool with IOT



5. Conclusions

- 複雑な細胞操作を目的として，TSS と GPC を融合した，高速操作と多点捕捉が可能な融合光ピンセット (IOT) を構築した。
- IOT に適したマイクロツールを設計し，生産性に優れたフォトリソグラフィを用いて作製した。
- 作製したマイクロツールを IOT を用いて操作し，有効性を確認した。

Reference:

K. Onda, H. Matsumoto, R. Iitsuka, F. Arai, "On-chip cell manipulation systems - Part 9: Multi-beam laser manipulation using phase control and high speed scanning", *Proceeding of JSME Conference on Robotics and Mechatronics*, pp.127 (2P1-C24), 2008 .