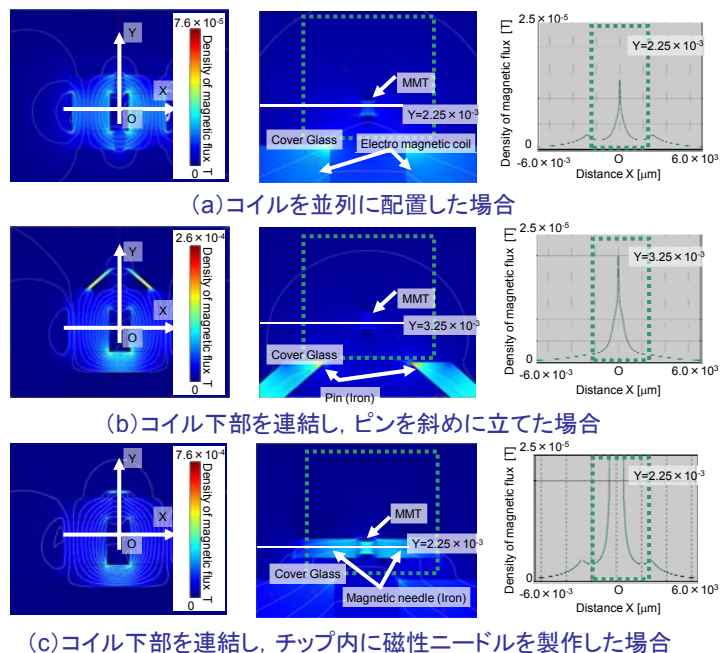


オンチップで磁気マイクロアクチュエータを集積し、高速駆動するには？

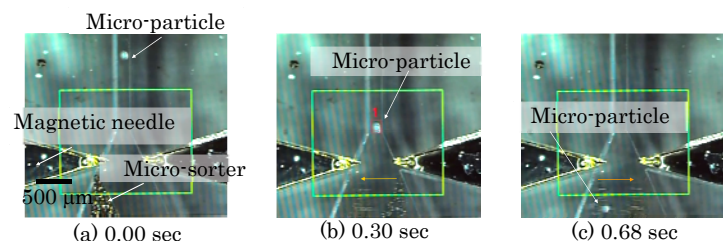
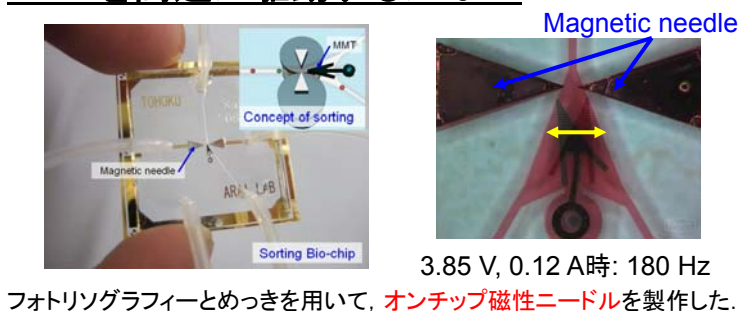
Abstract

We have developed on-chip magnetized magnetically driven microtools (MMT). MMTs are made of Poly-dimethylsiloxane (PDMS) and neodymium particles. A sorting MMT was designed for sorting of micro-particles on-chip. By increasing the density of magnetic flux with on-chip metal needle and magnetizing MMT, we have successfully operated sorting MMT and sorted micro-particles.

COMSOLによる有限要素解析(磁束密度)



MMTを高速に駆動するには？



最大駆動周波数 100倍 (18Hz → 180 Hz)

Conclusions:

For integration:

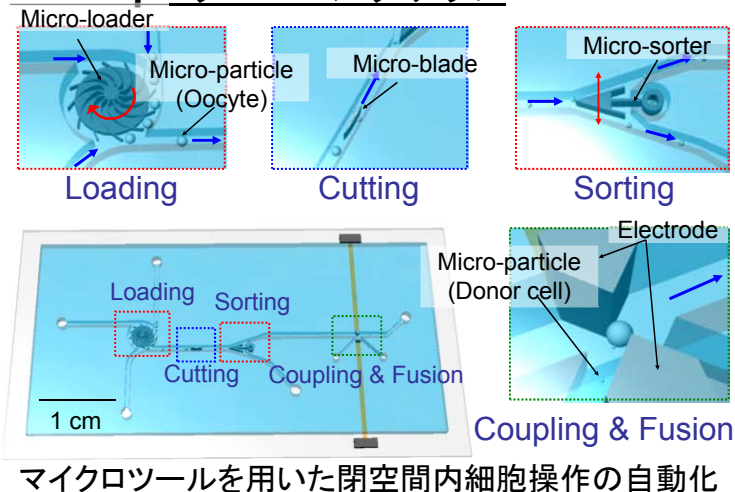
We have mounted a couple of pins on the electromagnetic coil to focusing the magnetic field.

For powerful actuation:

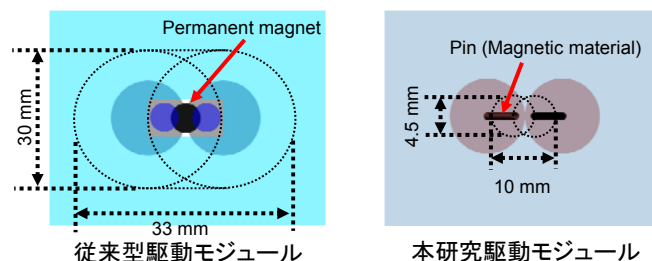
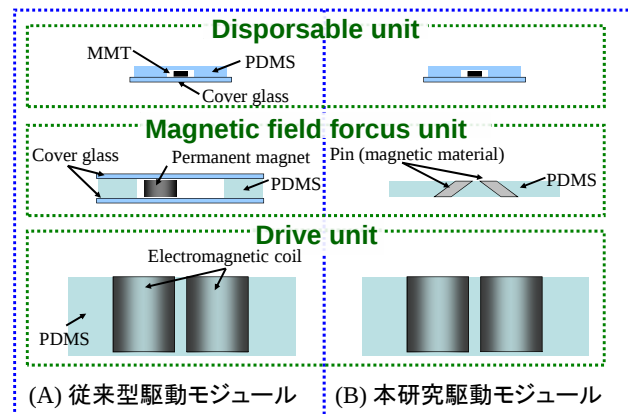
We assembled MMT between a pair of magnetic sharp needles fabricated on-chip by photolithography and electro-plating.

We applied 3.85 V and 0.15 A on the electromagnetic coils and the MMT was actuated at 180 Hz (tip velocity of MMT: 13.5 mm/s).

Concept: クローニングチップ



MMT同士の干渉問題を解決するには？



磁場干渉領域(3.85 V, 0.12A時) 約1/20 (面積)

References:

F. Arai, S. Sakuma, Y. Yamanishi, and K. Onda, "POWERFUL ACTUATION OF MAGNETIZED MICROTOOL BY FOCUSED MAGNETIC FIELD ON A DISPOSABLE MICROFLUIDIC CHIP", Proc. of MEMS2009, pp. 51-54 (2009).