

MECHANICAL CHARACTERIZATION OF CYANOBACTERIA UNDER OSMOTIC STRESS

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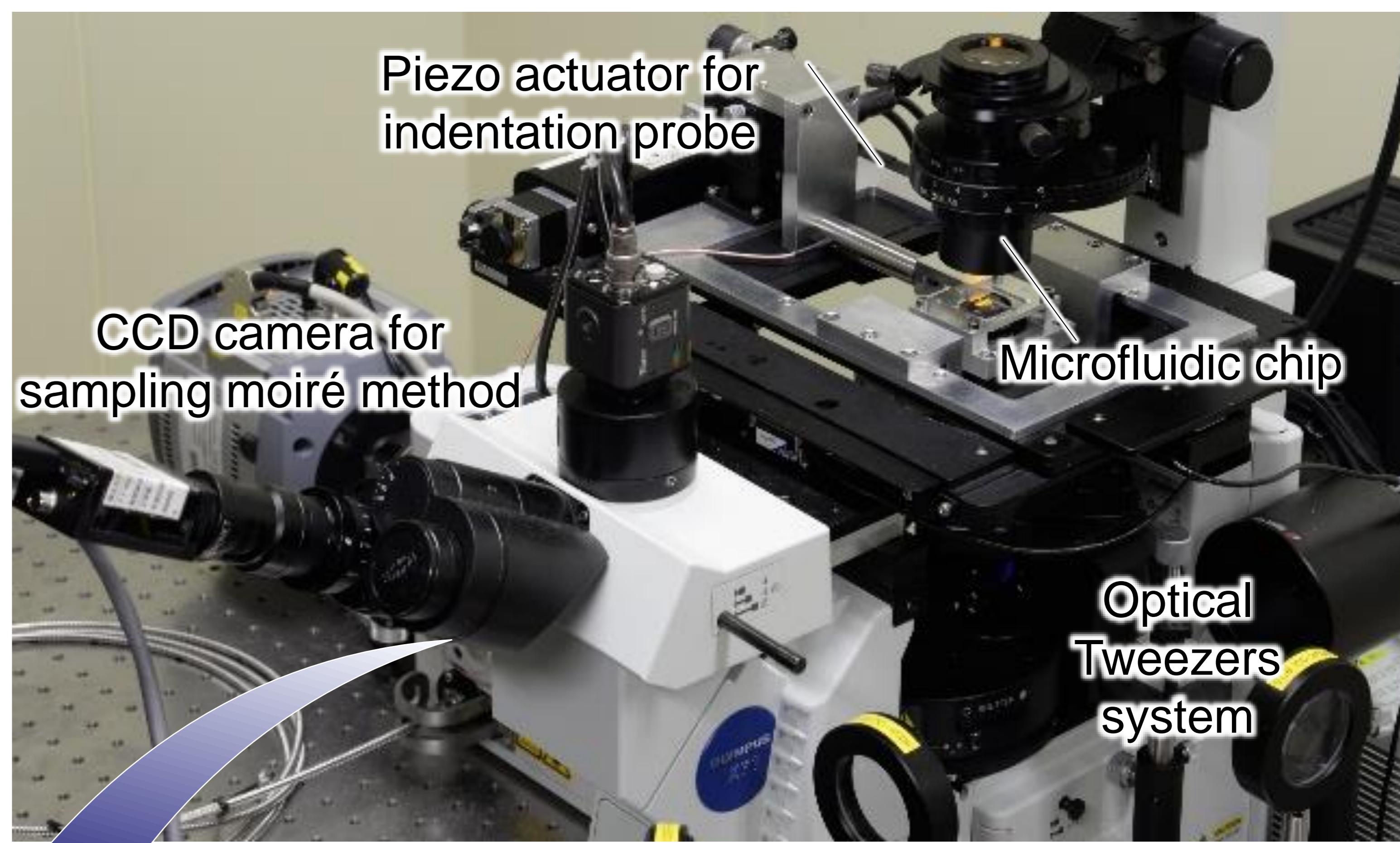
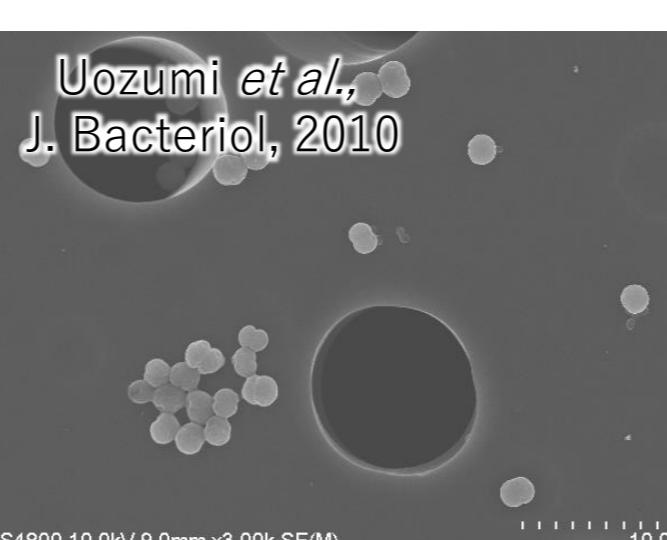
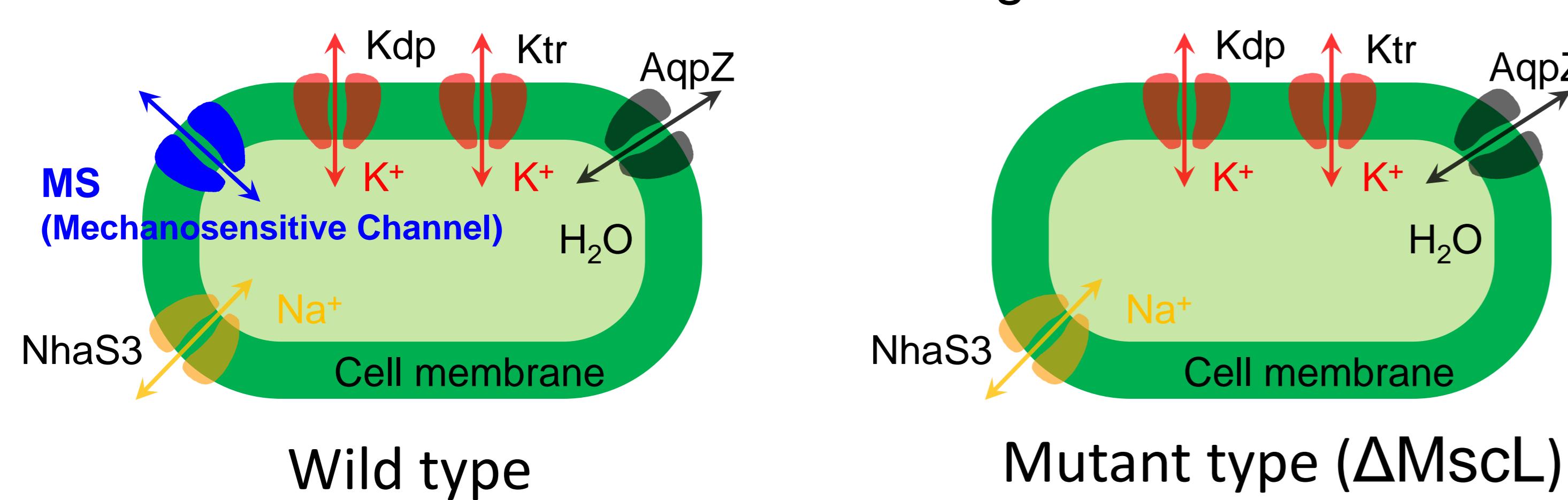
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How did we measure a floating “2 μm cell” on a chip?

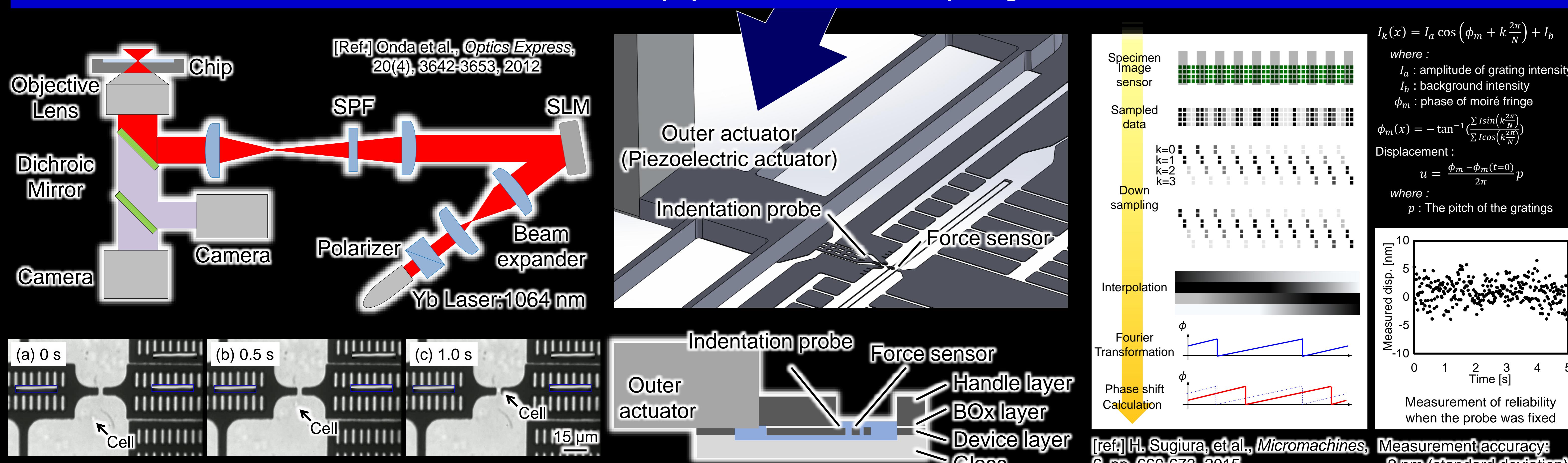
Synechocystis sp. PCC6803

- Floating unicellular cyanobacterium
- Model microorganism: photosynthesis, biofuel and acclimation to environmental changes.

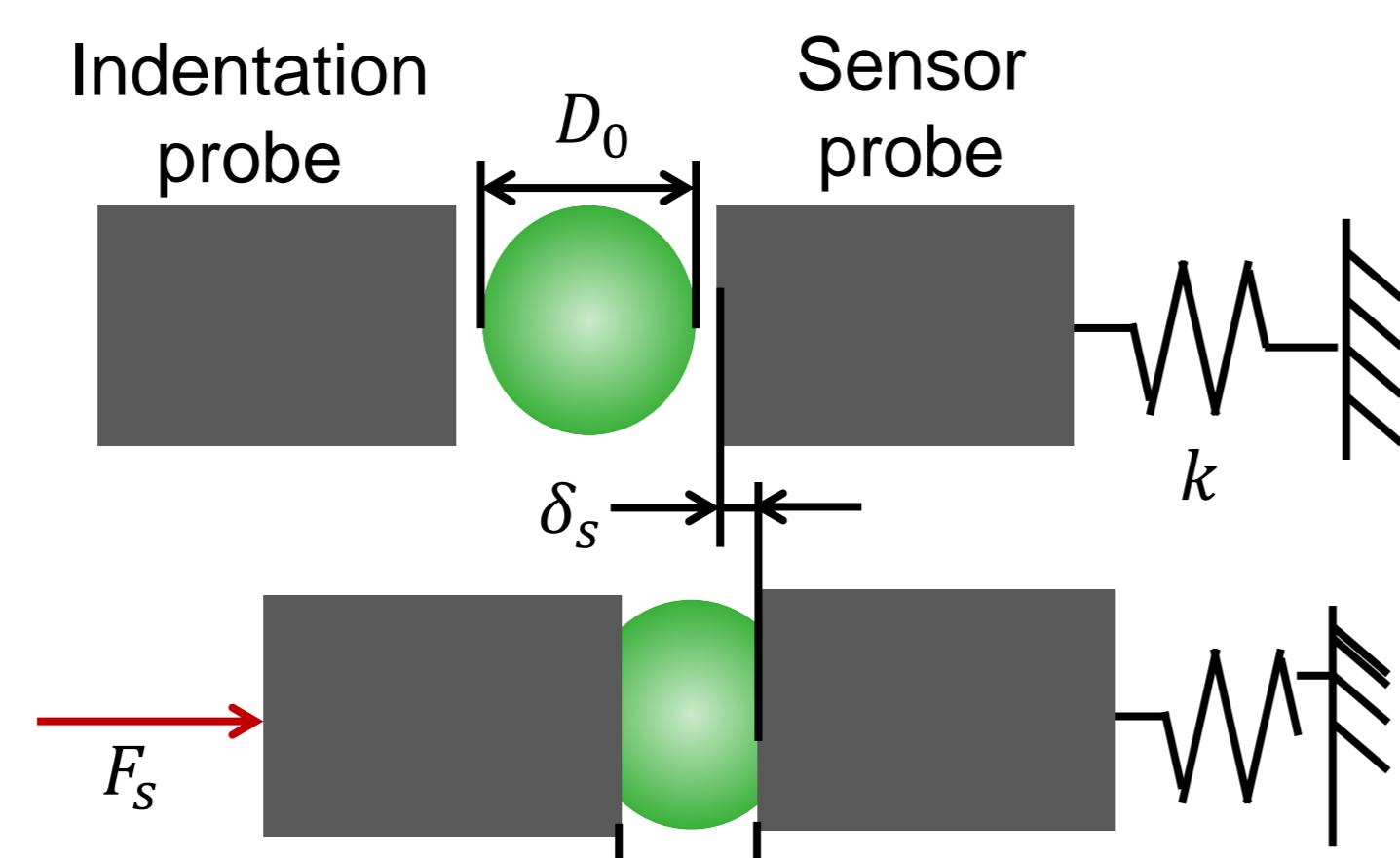
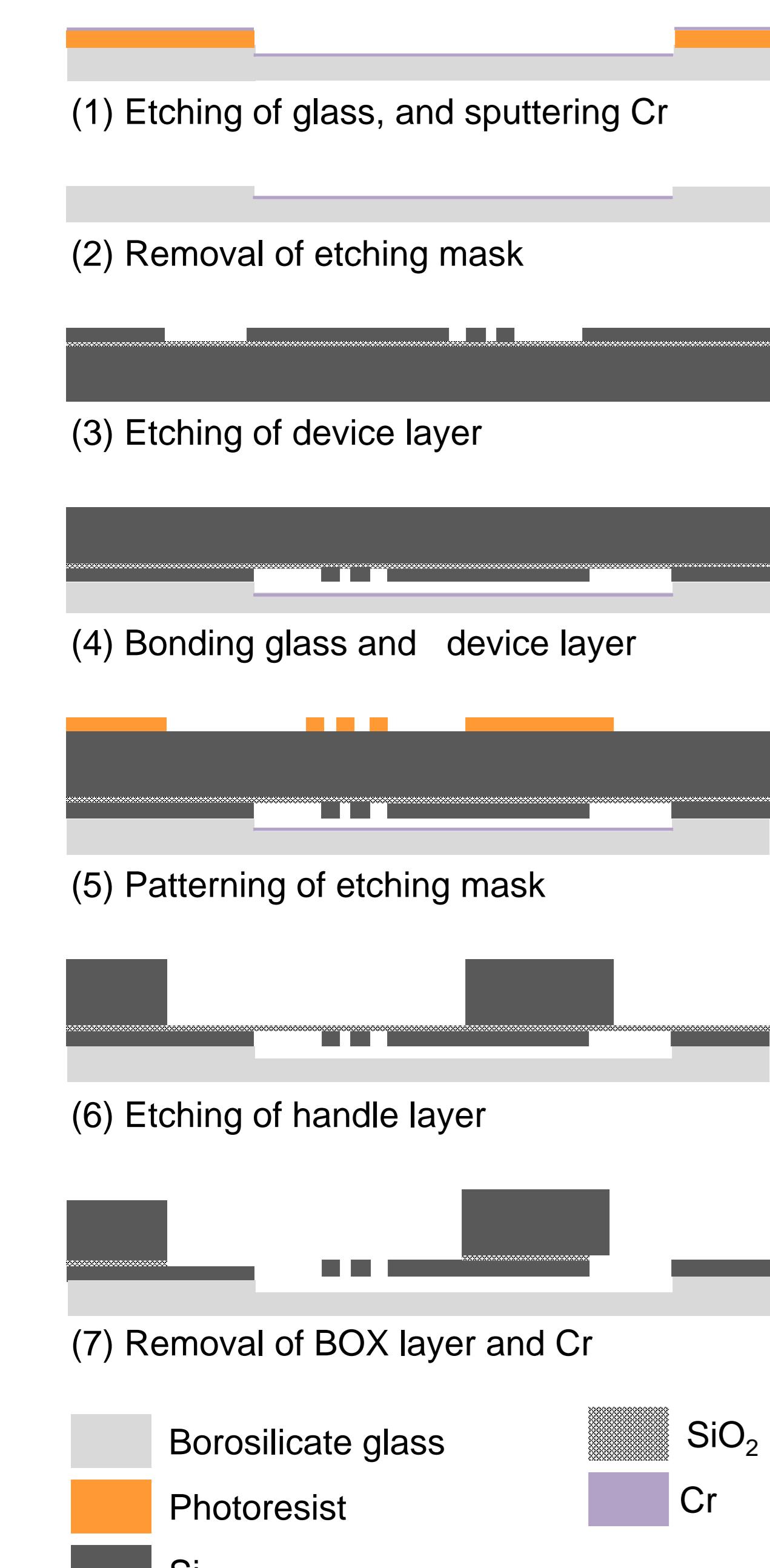


Purpose : Evaluate the mechanical properties of wild type and mutant type cell under osmotic shock.

Direct drive of on-chip probe, and Sampling moiré method



Optical tweezers

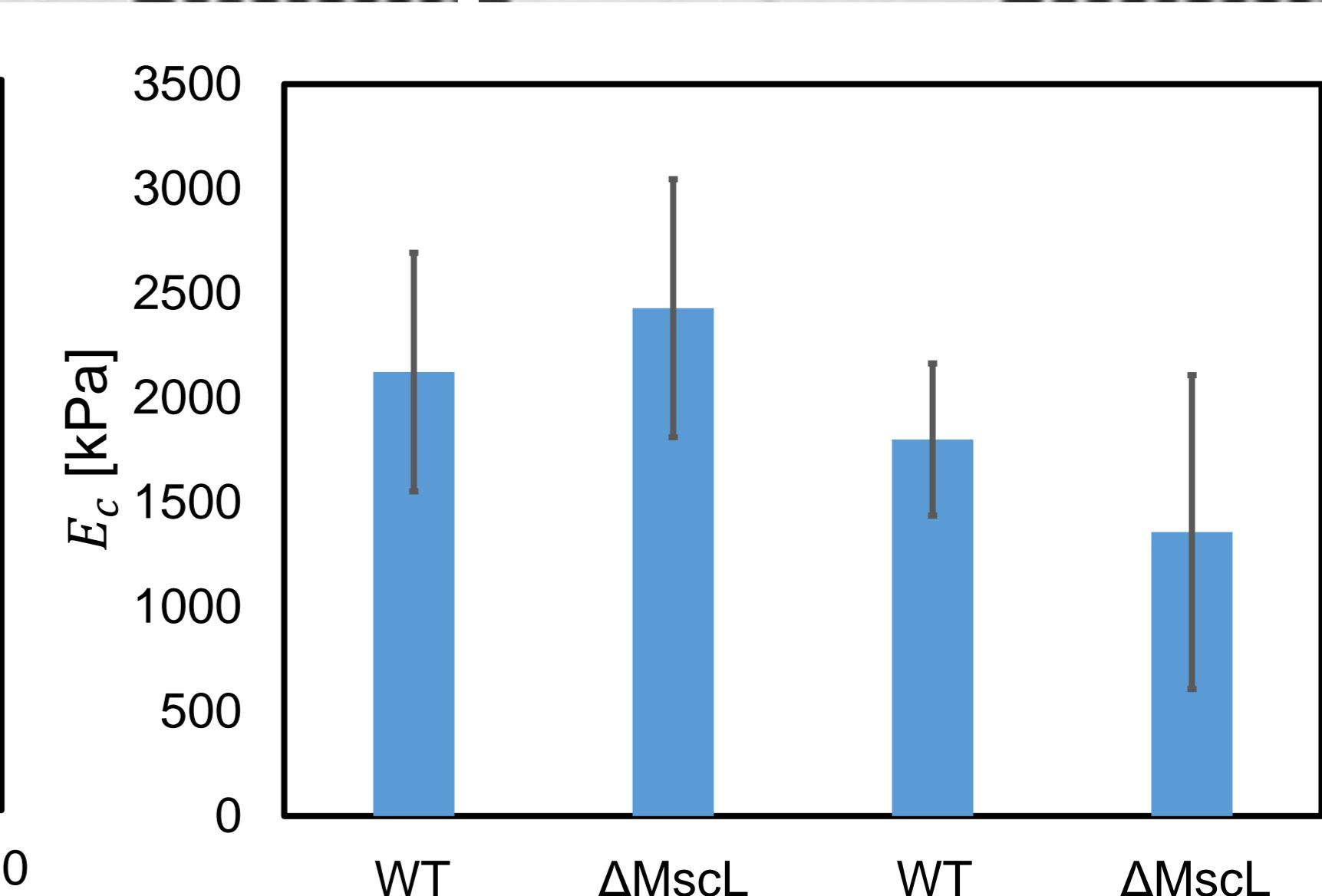
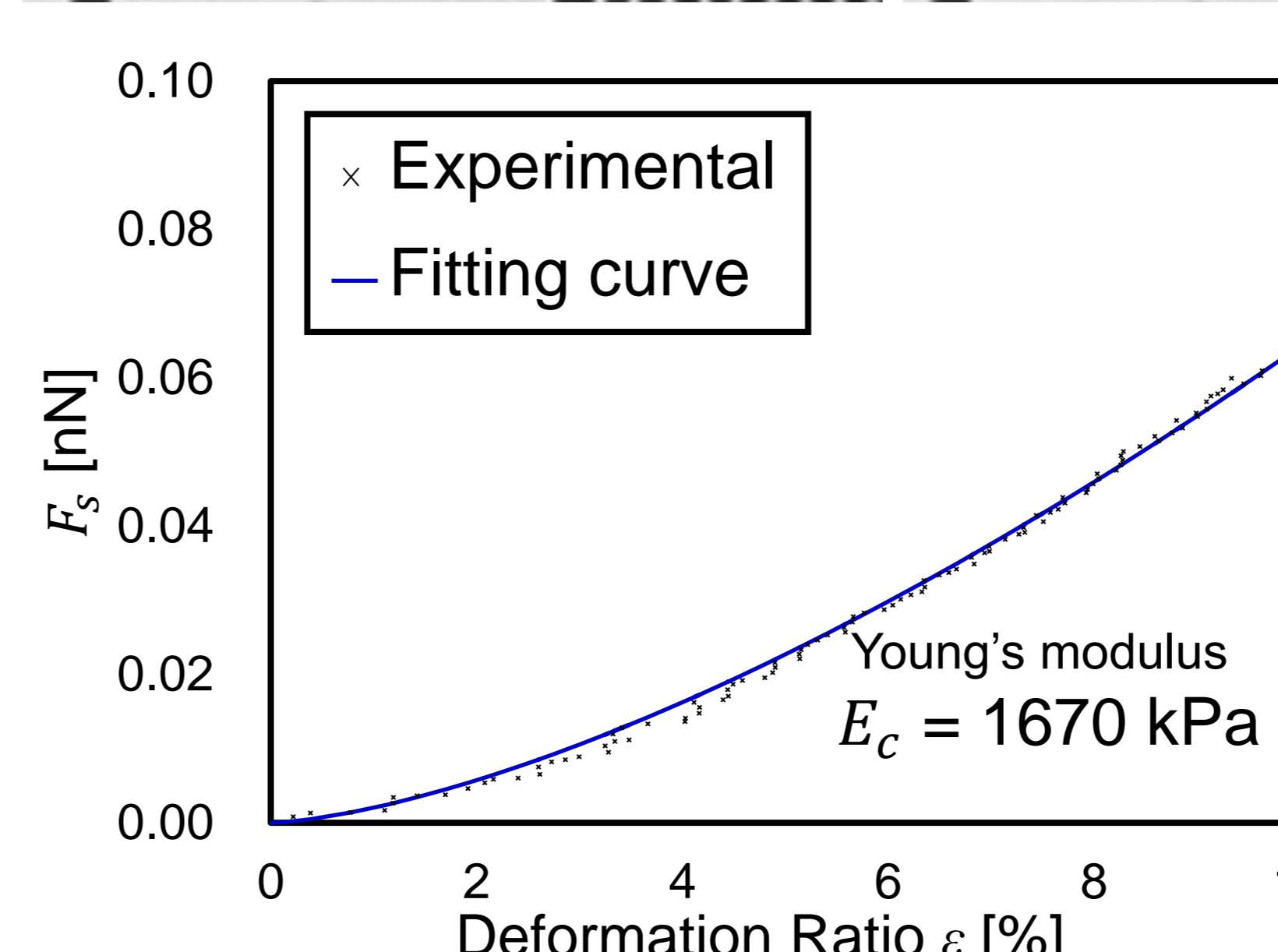
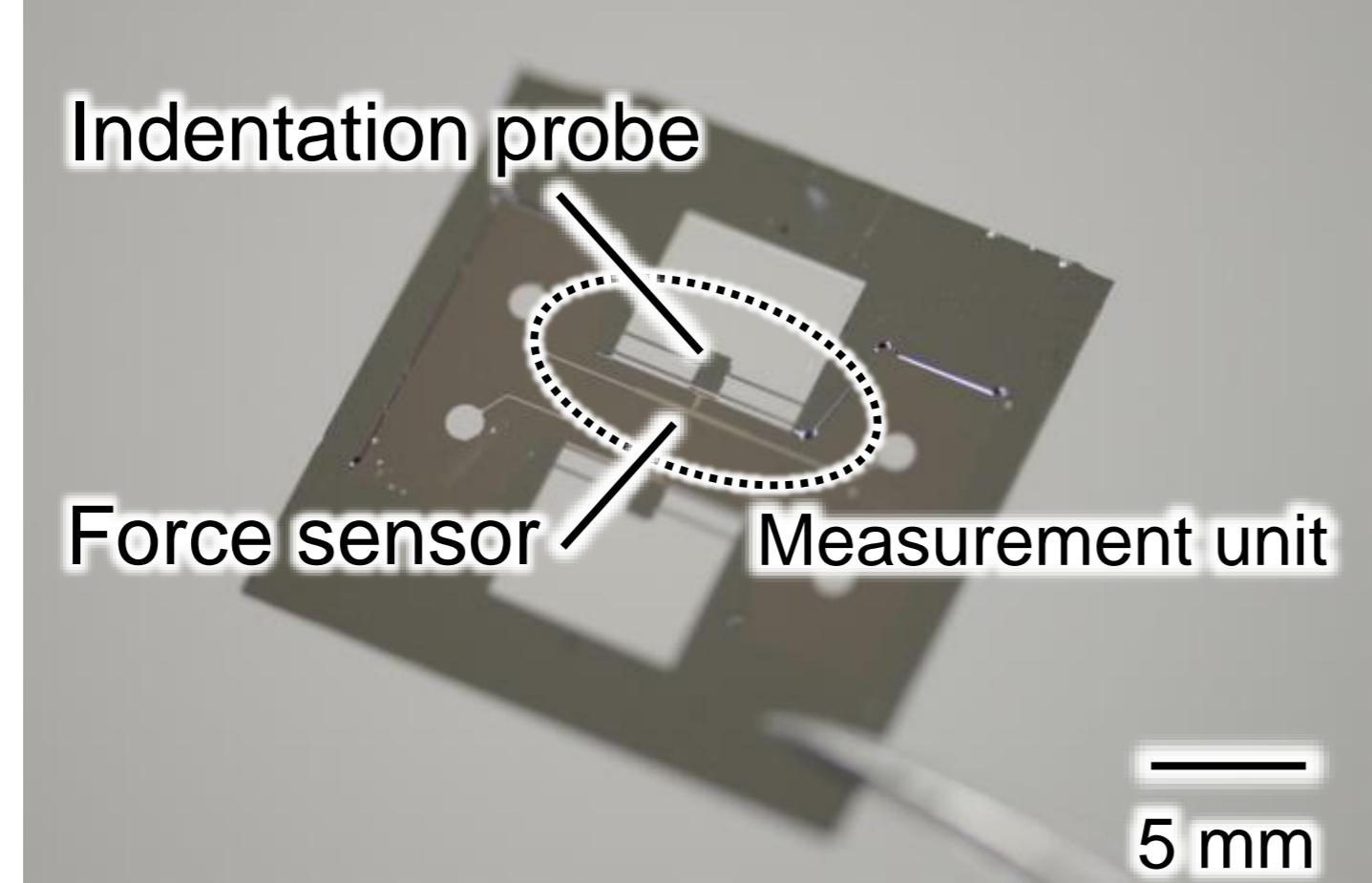


Hertzian contact theory

$$F_s = \frac{E_c \varepsilon^{3/2}}{3(1-\nu^2)} D_0^2$$

E_c : Young's modulus of cell
 ν : Poisson's ratio
 F_s : Force
 D_0 : Original size of cell
 D : Deformed size of cell
 ε : Deformation rate

$$\varepsilon = (D_0 - D)/D_0$$



Conclusion: We succeeded in measuring the young's modulus of wild type and mutant type of *Synechocystis* sp. PCC6803 under osmotic stress.

Acknowledgement :

This work is partially supported by Scientific Research from Ministry of Education, Culture, Sports, Science and Technology (15H02226).

We report the evaluation results of mechanical characterization of *Synechocystis* sp. PCC 6803. We constructed the force measurement system using the microfluidic chip. Using the system, we evaluated the Young's modulus of two cell groups of wild type and mutant type, which was knocked out mechanosensitive channels. We confirmed that We succeeded in measuring the mechanical characteristics of cyanobacterium.