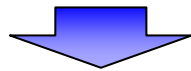
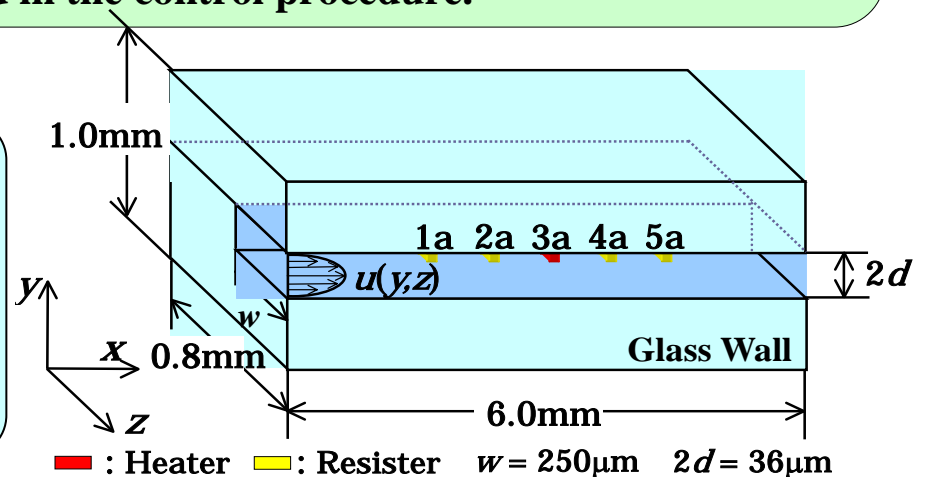


Ultra-low flow meter for artificial pancreas

Humans obtain biological energy for living by transporting glucose into cells. Diabetic patients cannot make enough amount of substance, called insulin, required for transporting glucose into cells. Artificial pancreas is expected to substitute the damaged pancreas. By injecting insulin into the patients' bodies from the artificial pancreas, diabetic patients may live like healthy people. But the amount of injected insulin must be strictly controlled in order to avoid adverse effects. Ultra-low flow meter for insulin is highly requested in the control procedure.



No implantable flow meter has been developed for the ultra-low flow rate in the range of several $\mu\text{l}/\text{min}$. We are developing a thermal type of flow meter, and conducting thermal analysis as well as experiments of ultra-low flow meter for the purpose of optimum designing.



Measuring principle

An electric resistance 3a deposited on the internal wall of the channel heats up the flow intermittently, and other electric resistances 4a and 5a downstream measure the temperature changes induced by the heating. Flow rate is correlated with the difference in the time at the temperature maximum between the two resistances 4a and 5a.

Plan view of the flow meter

