Innovating Fuel Technology through Microfluidic Devices

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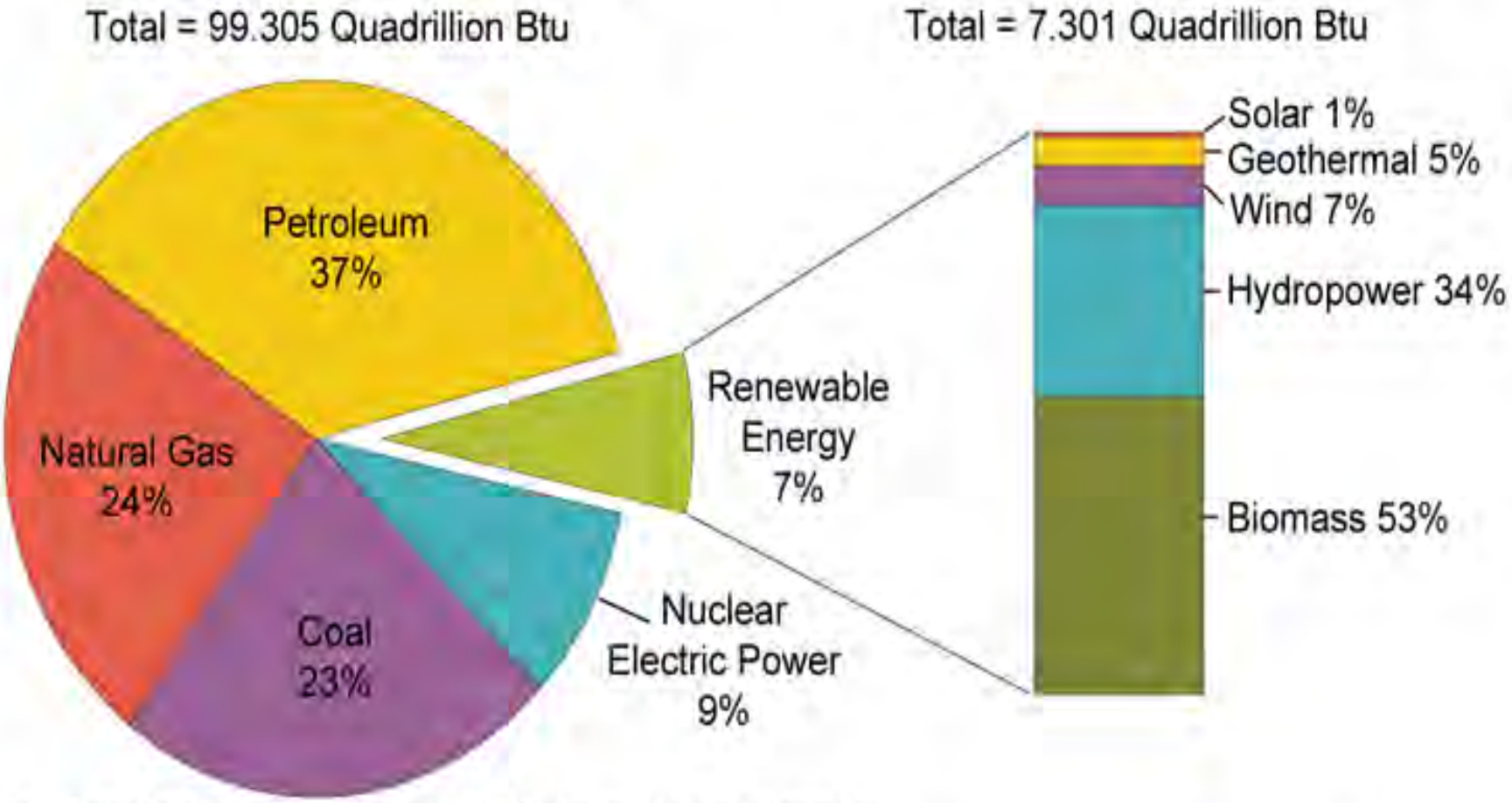
Renewables are the Future!

Courtesy of The National Renewable Energy Laboratory (NREL)

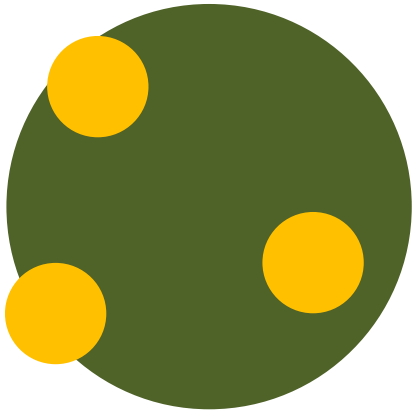
The Role of Renewable Energy in the Nation's Energy Supply, 2008



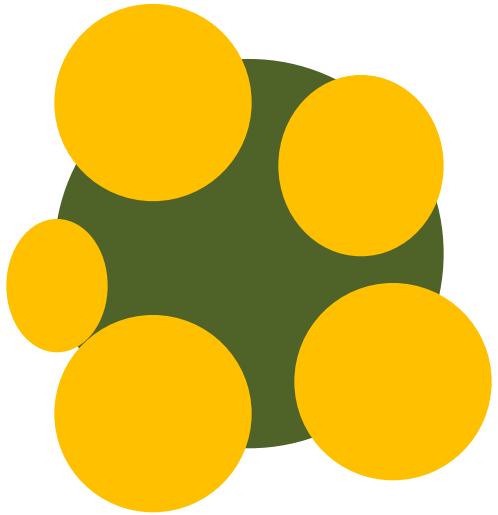
Note: Sum of components may not equal 100% due to independent rounding.
Source: Energy Information Administration, *Renewable Energy Consumption and Electricity Preliminary Statistics 2008*, Table 1: U.S. Energy Consumption by Energy Source, 2004-2008 (July 2009).

Algae Cells

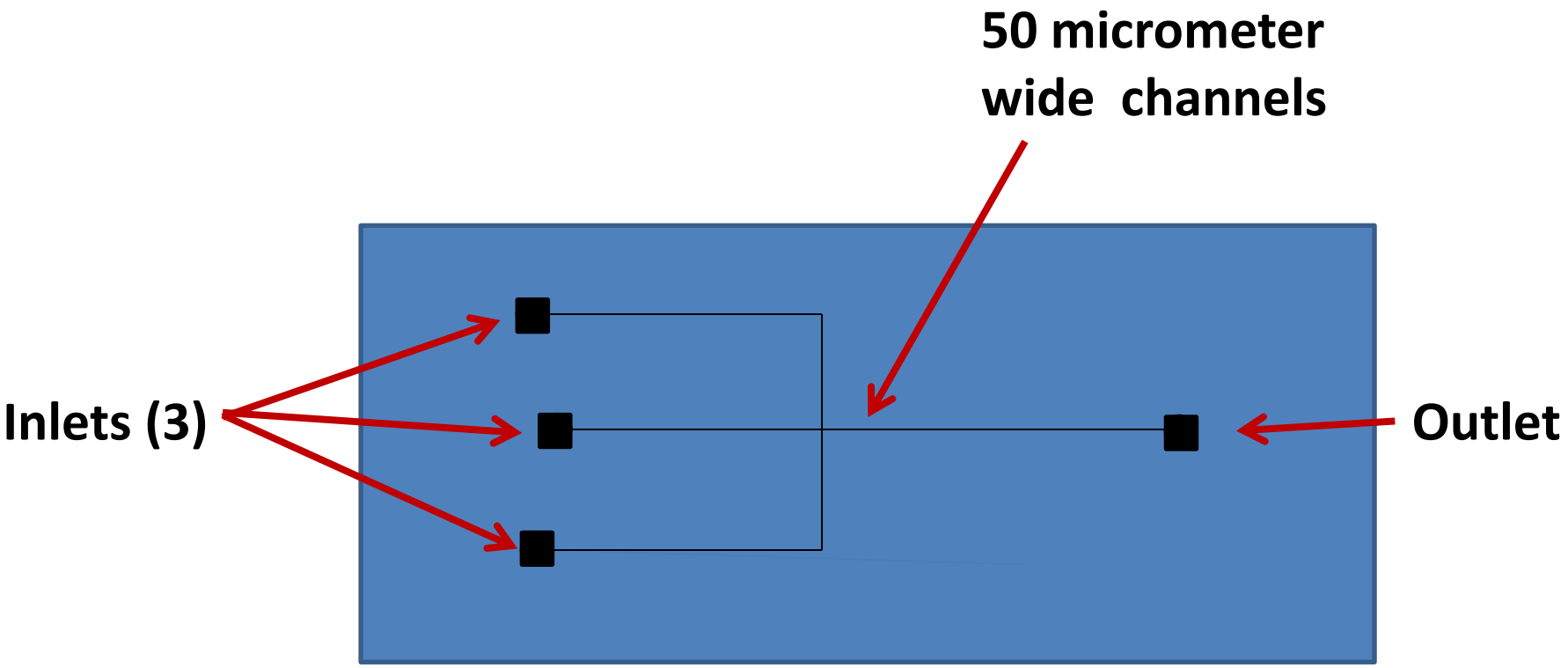
Low Lipid Concentration



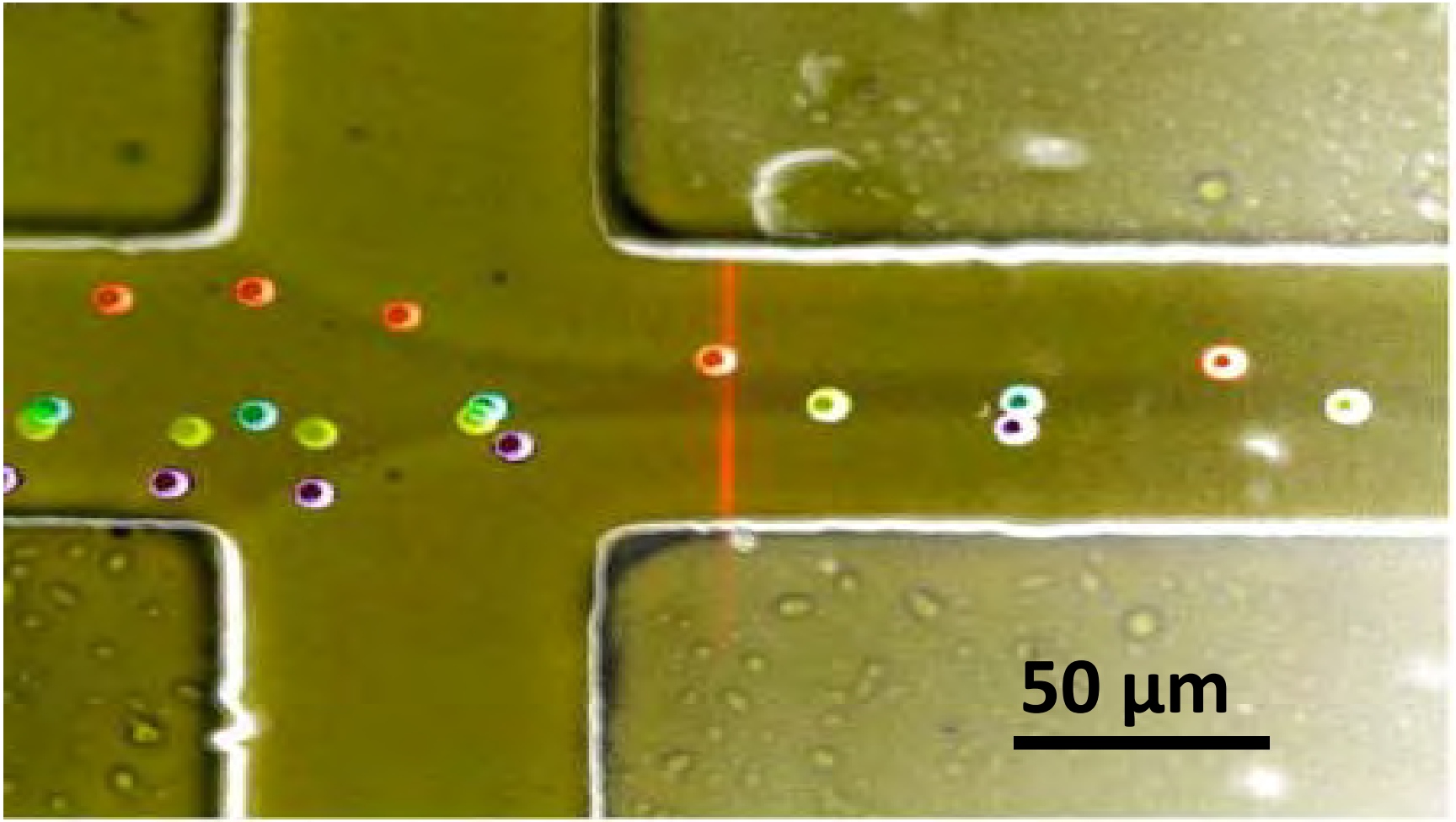
High Lipid Concentration



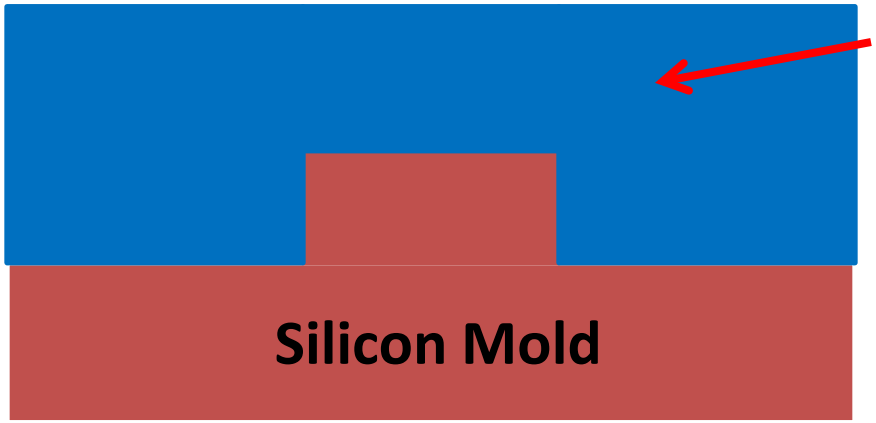
Top View of Microfluidics Device



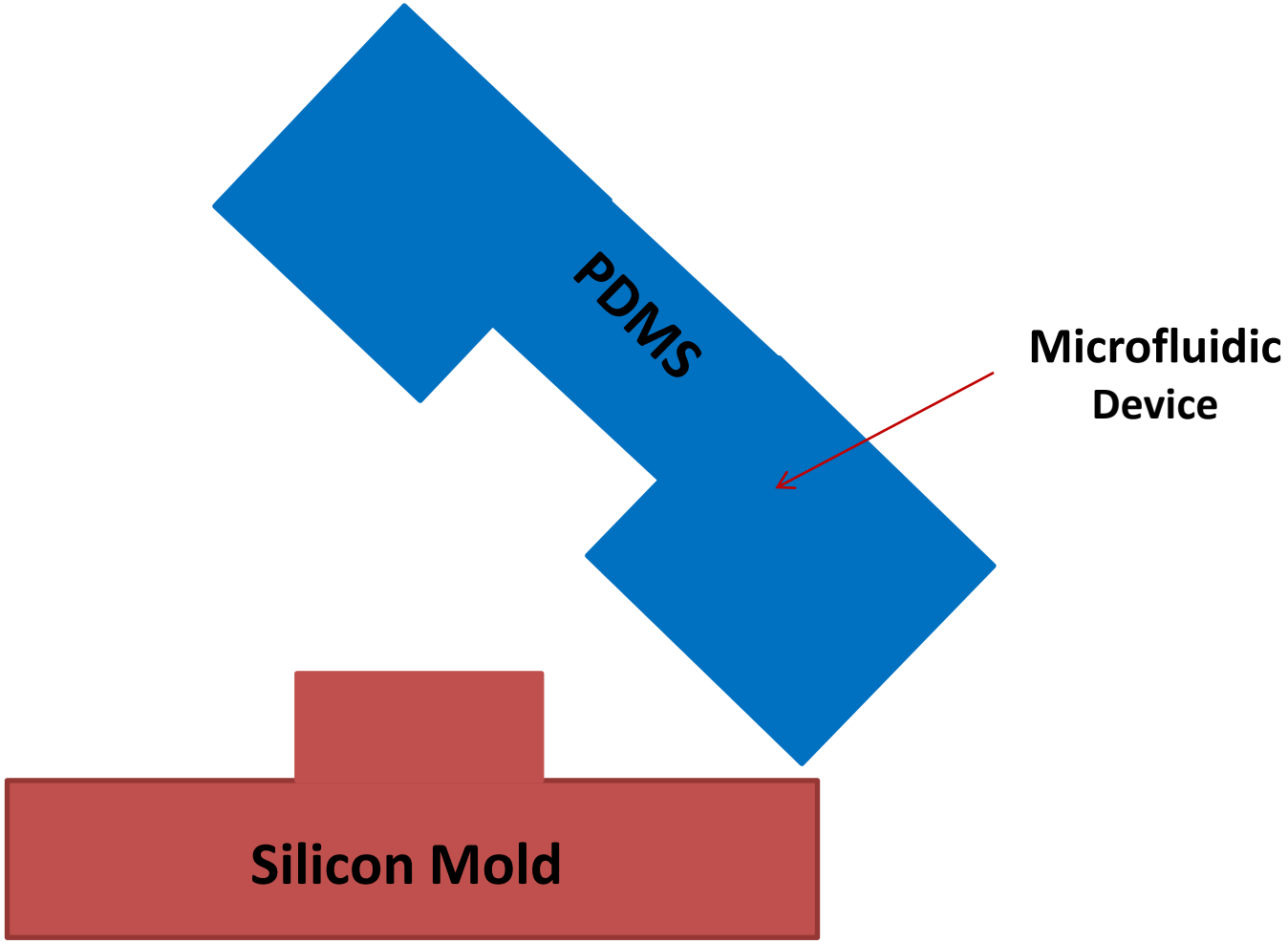
Efficiency of Microfluidics Device



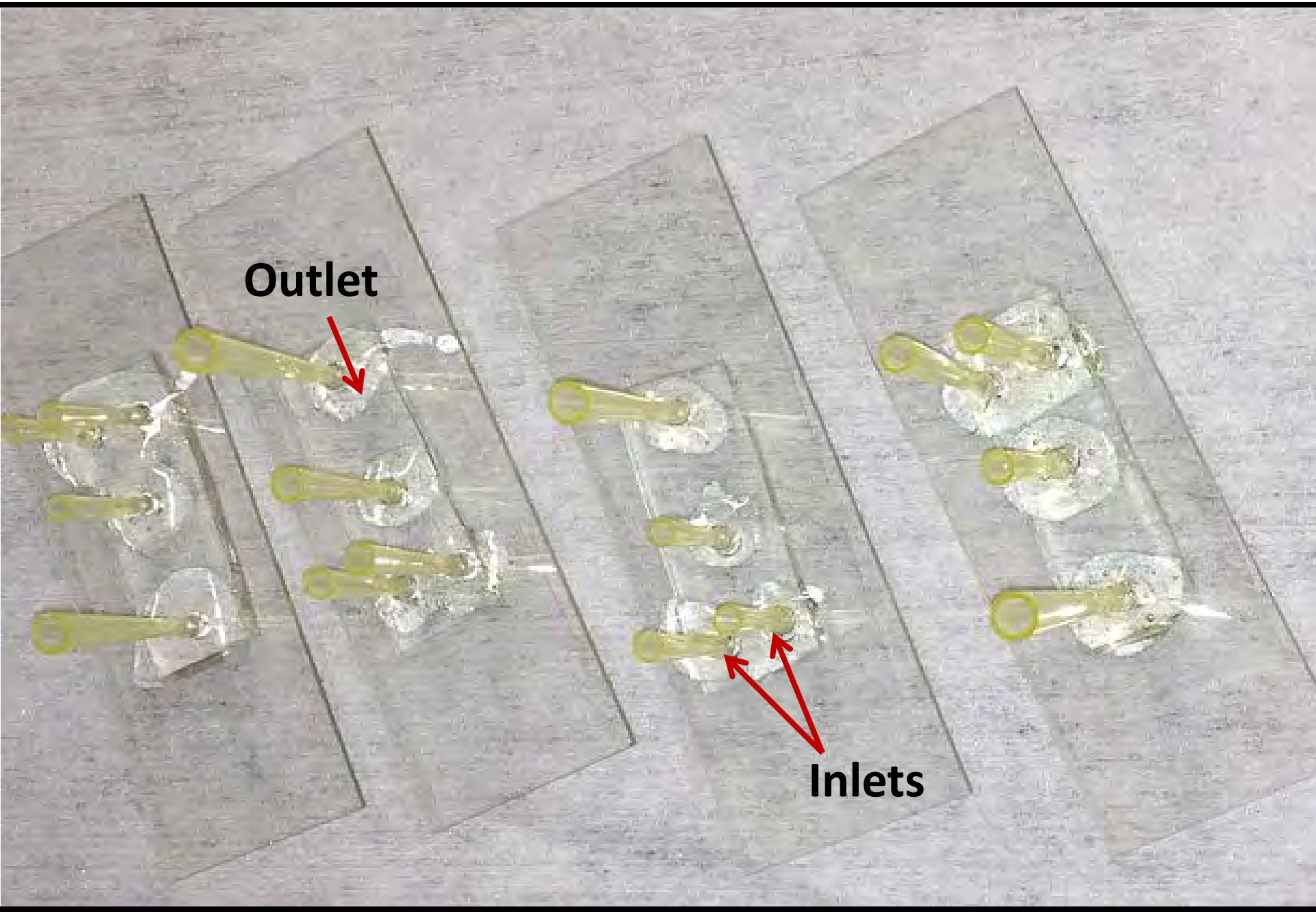
Cross Sectional View of Fabrication

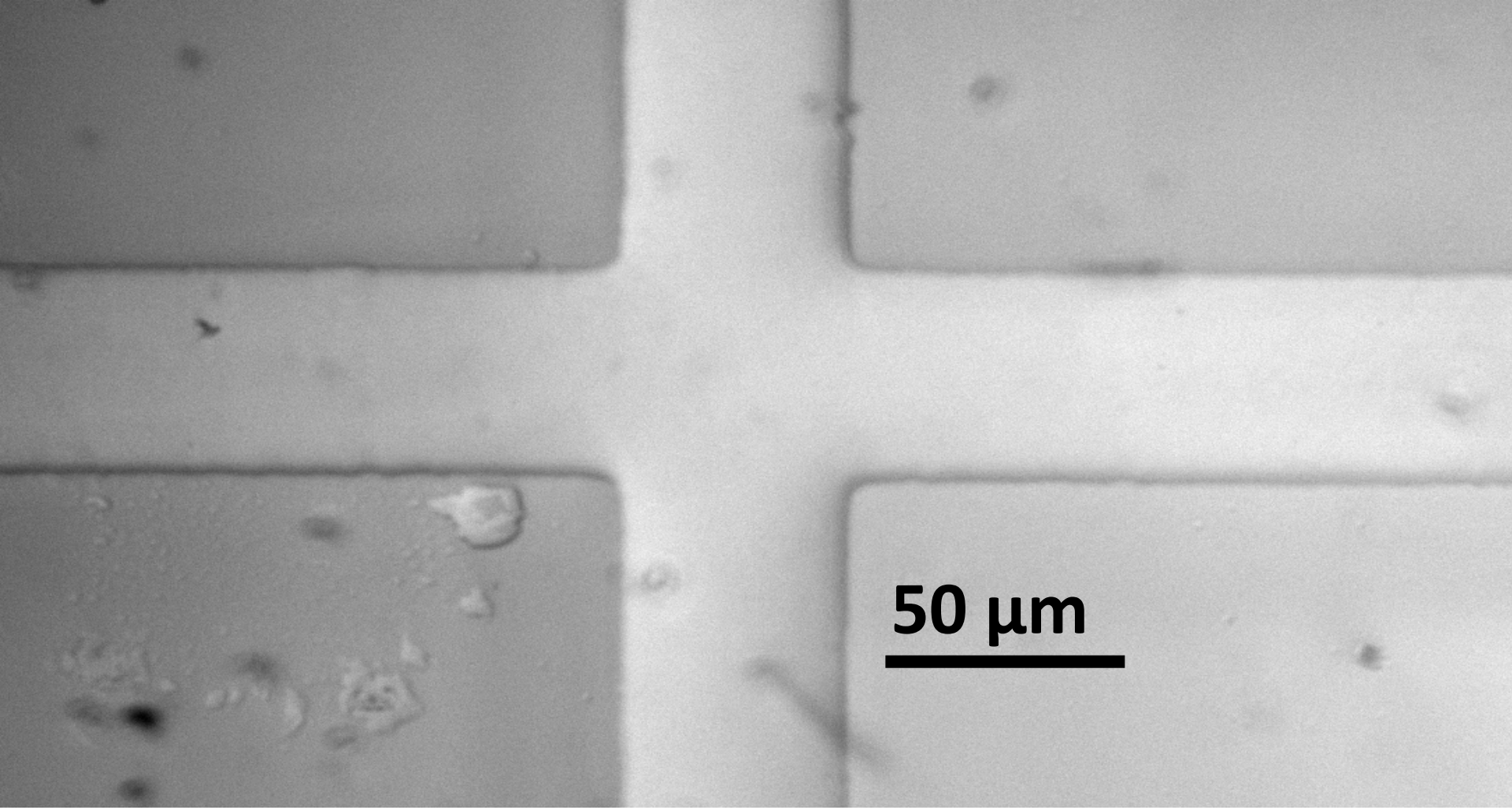


Cross-Sectional View of Fabrication

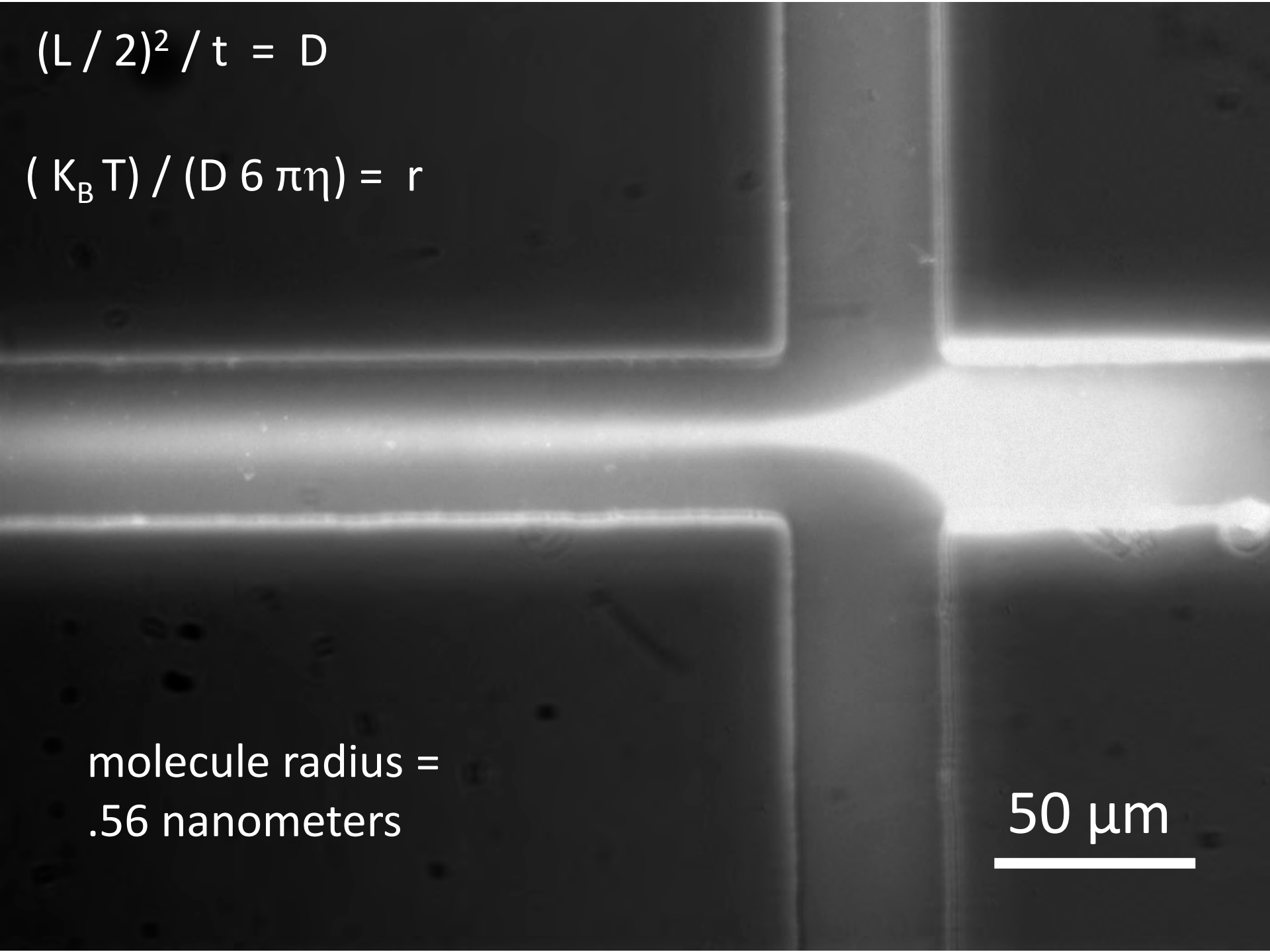


Cross-Sectional View of Fabrication


Outlet
Inlets



Device #	Rate of beads in fluid (bead/ min)
Device #1 (Longer channels)	4.67 beads/min
Device #2 (Shorter channels)	14.0 beads/min


$(L / 2)^2 / t = D$
$(K_B T) / (D\ 6\ \pi\eta) = r$
molecule radius =
.56 nanometers
50 µm

What we learned

Microfluidic devices help us in different applications.

- Provide a more efficient method of studying the making of biofuels, at a time when renewable sources are needed the most
- Aid in estimating the size of cells and even particles that are at the molecular level.

Acknowledgements

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