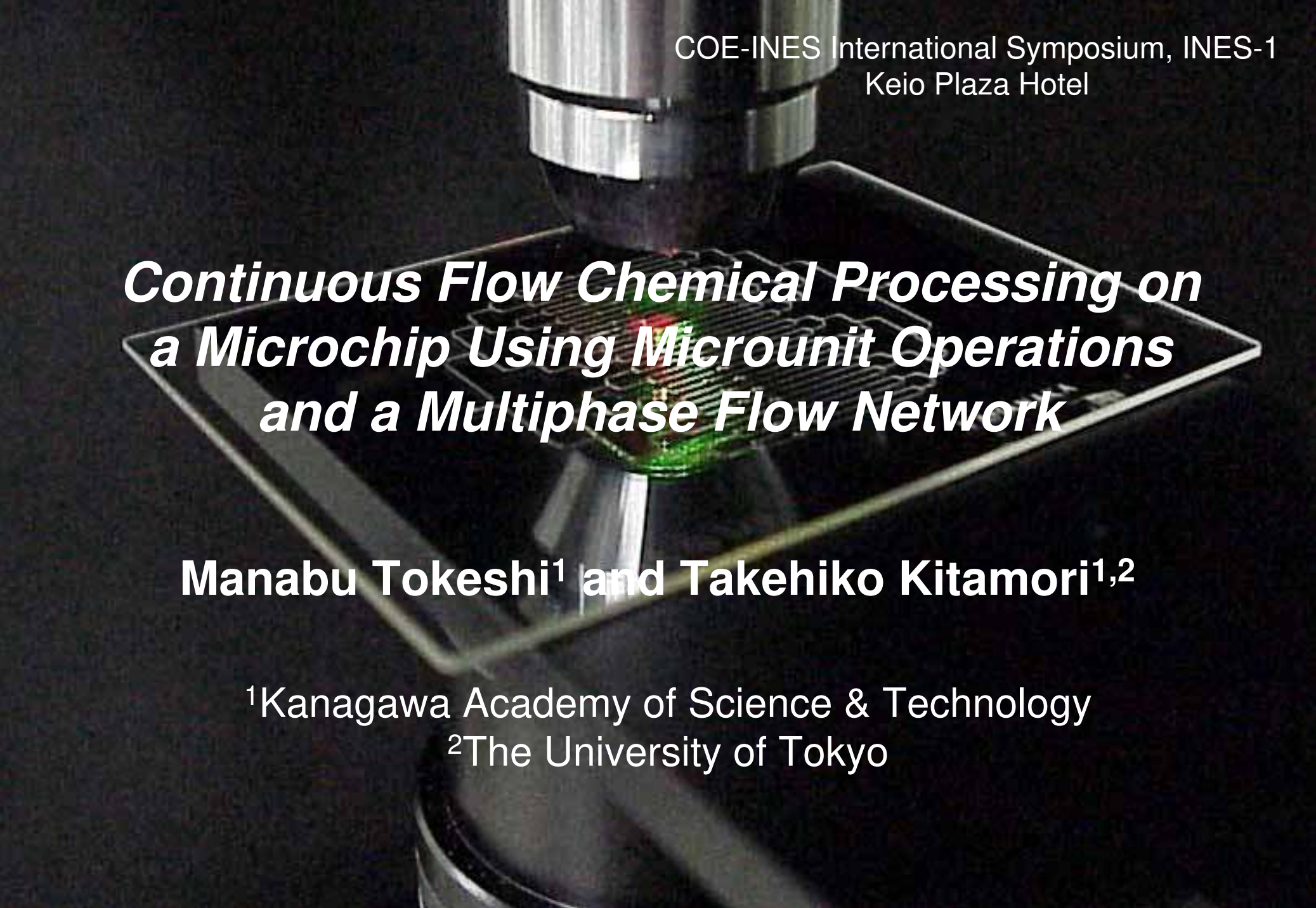

COE-INES International Symposium, INES-1
Keio Plaza Hotel

Continuous Flow Chemical Processing on a Microchip Using Microunit Operations and a Multiphase Flow Network

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[2]The University of Tokyo

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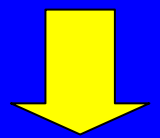
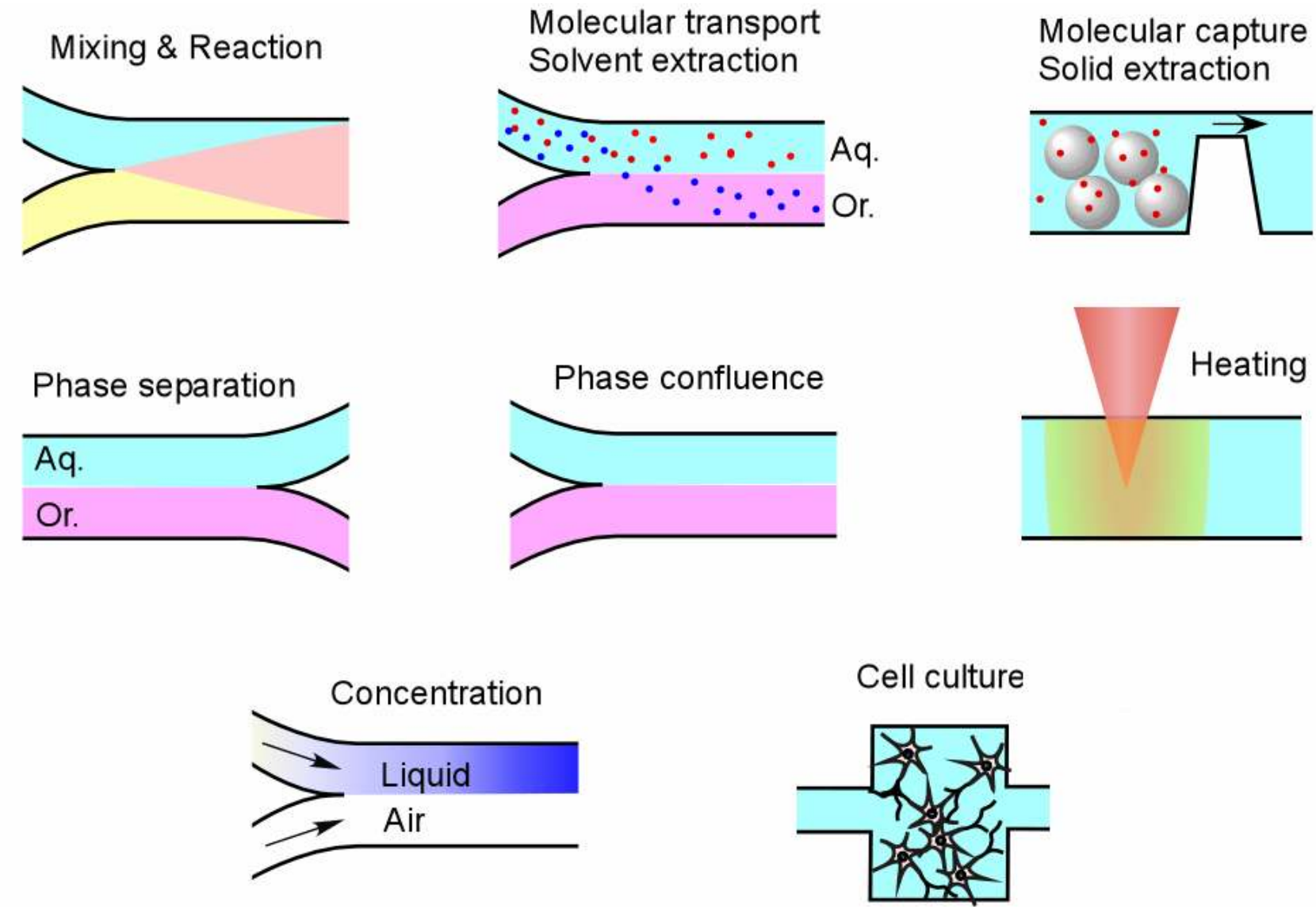
How to realize "Chemical Processing" on a Chip ?

- Micro unit operations (MUO)
- Multiphase flow network



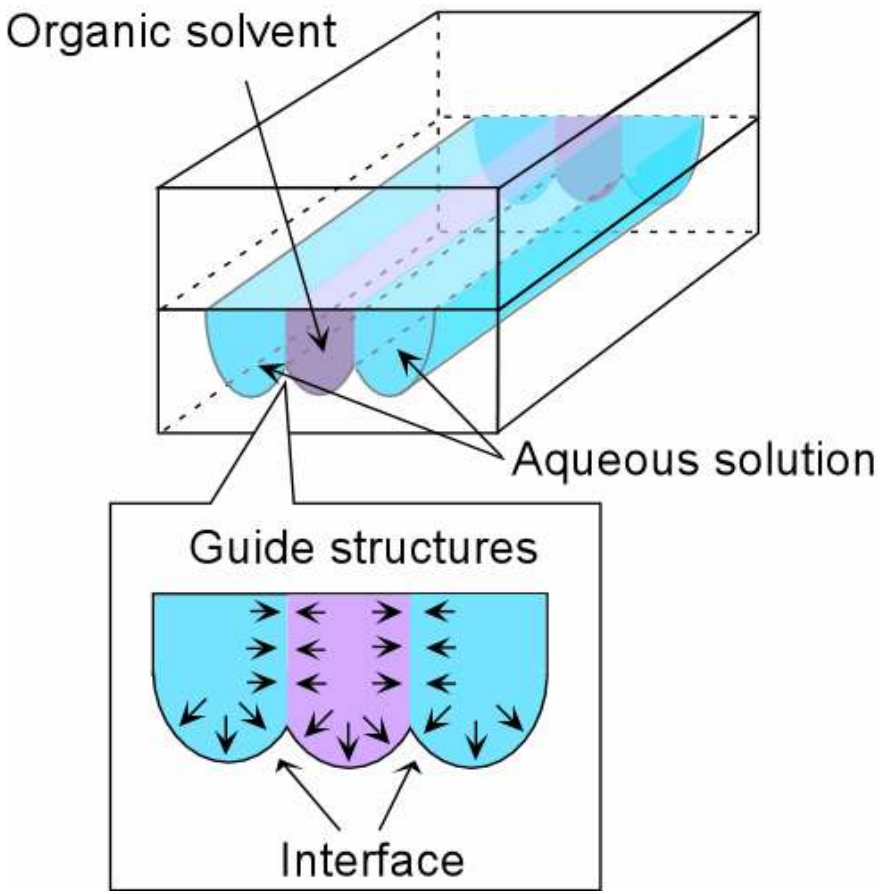
Continuous Flow Chemical Processing (CFCP)

Micro Unit Operation (MUO)

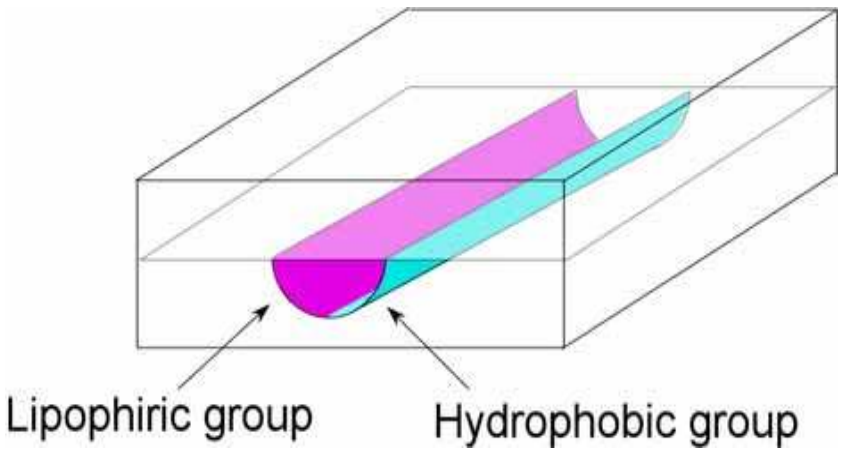


Stabilization of Multiphase Flow Network Inside Microchannels

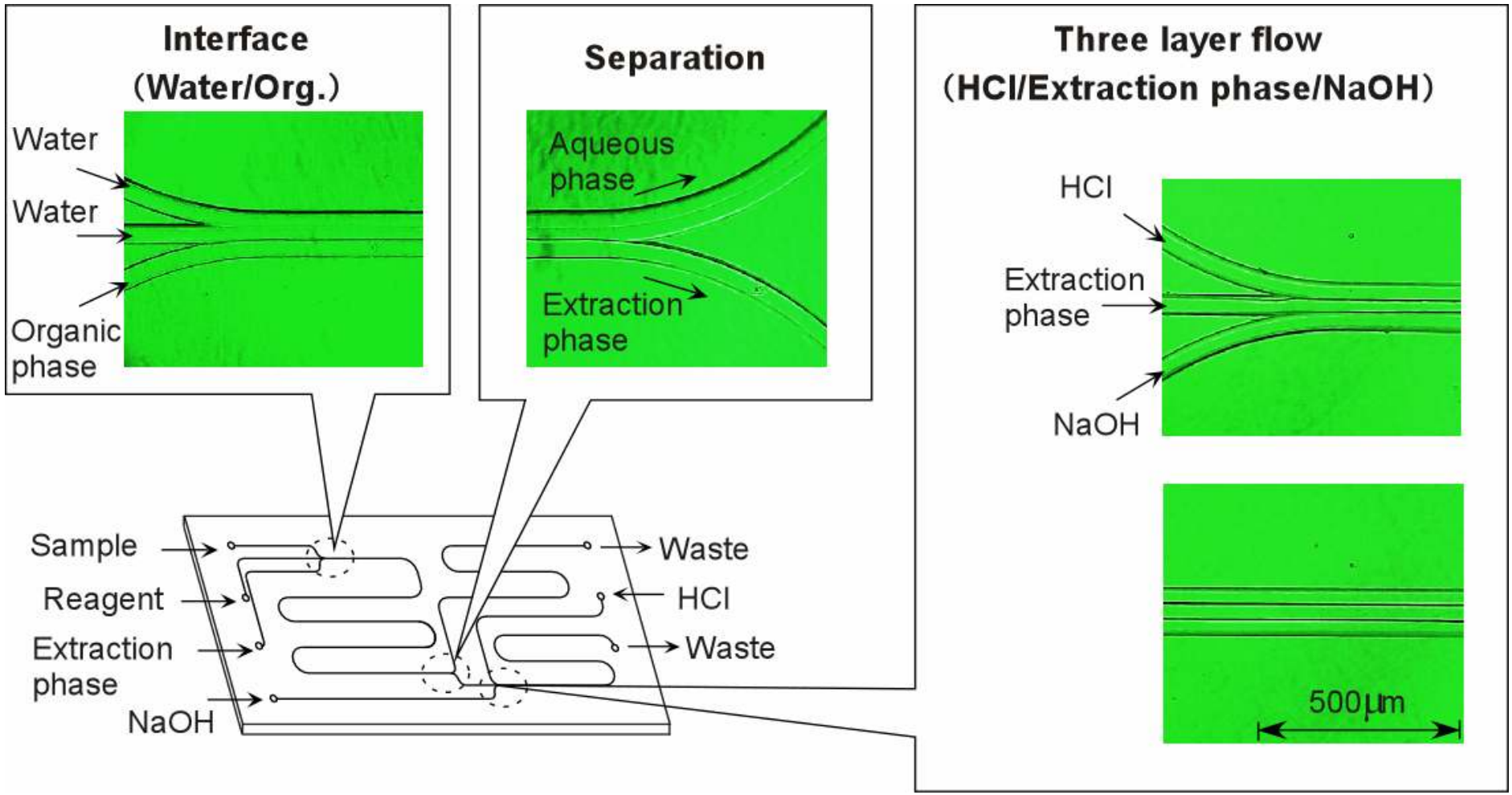
Guide structures



Surface modification



Multiphase Flow Network

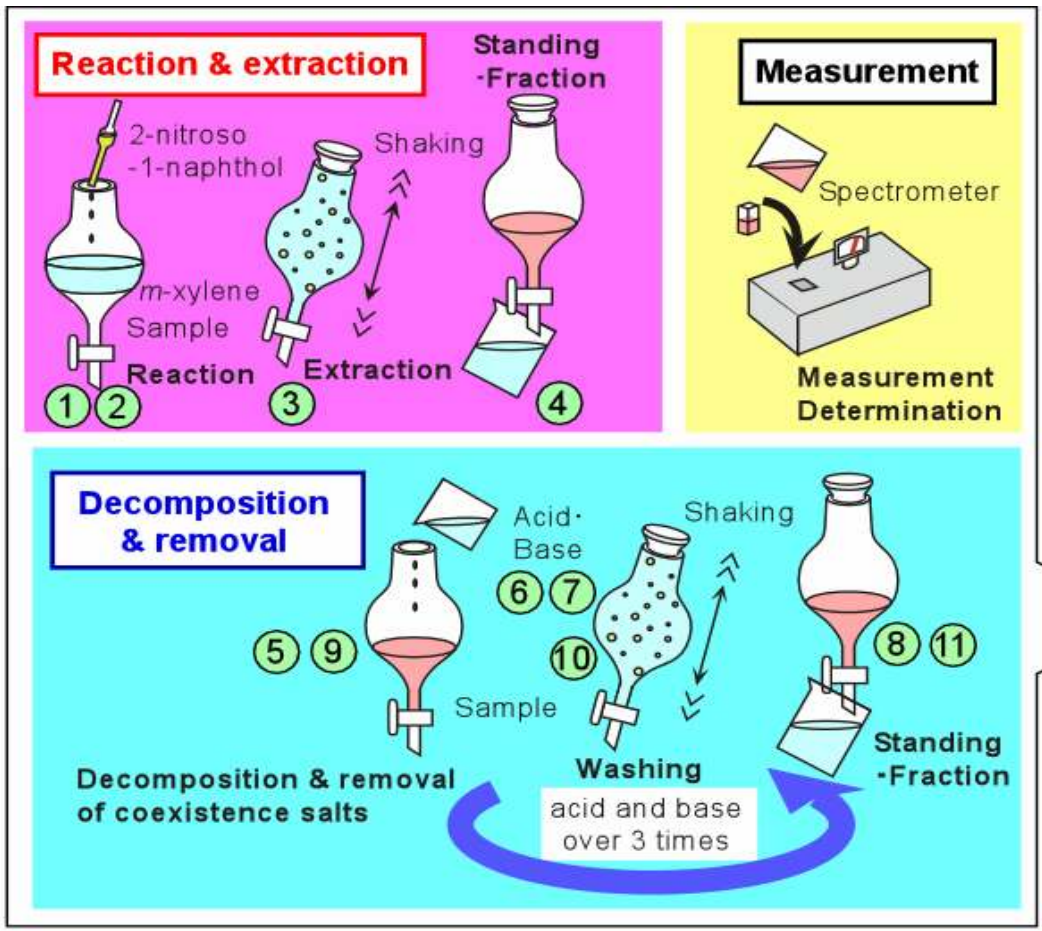


Example of Co wet analysis using CFCP

Procedures of Co Wet Analysis

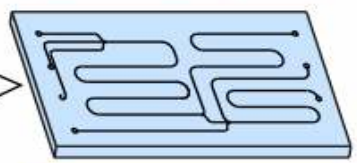
① Mixing･Reaction
② Confluence
③ Extraction
④ Phase separation

⑤ Confluence
⑥ Decomposition
⑦ Extraction
⑧ Phase separation
⑨ Confluence
⑩ Removal
⑪ Phase separation



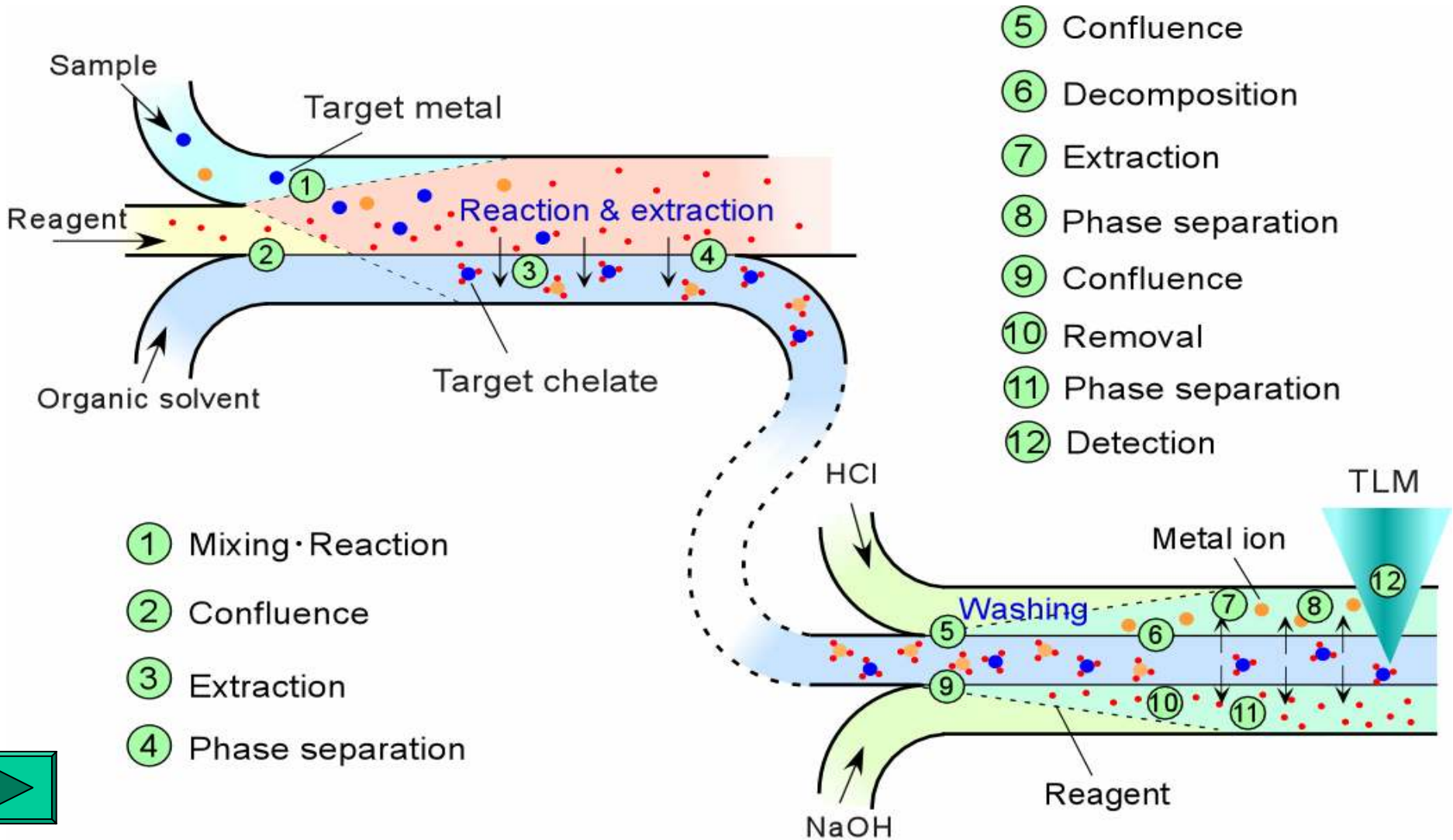
⑫ Detection

Same functions

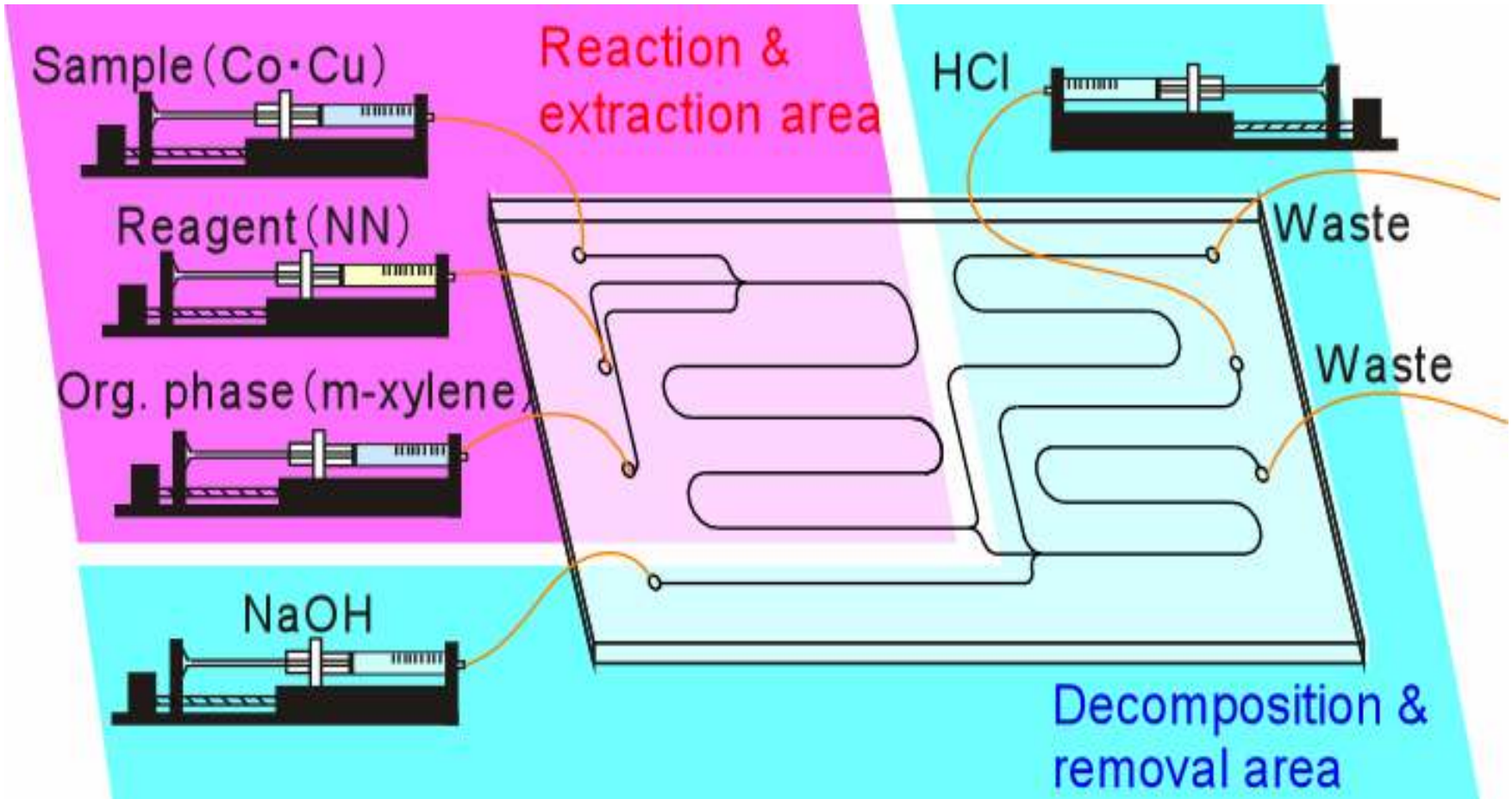


Integration

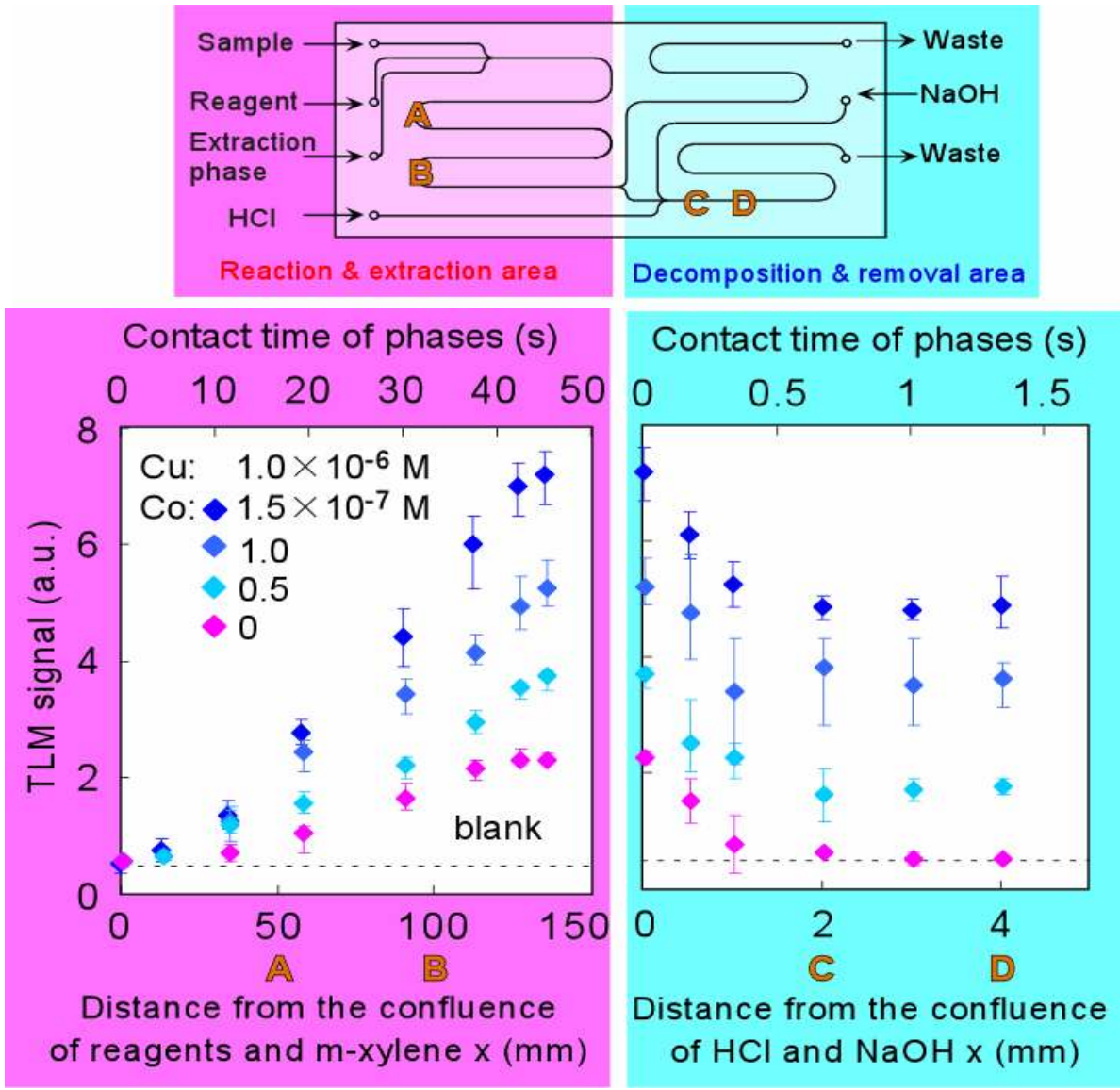
Combination of Micro Unit Operations required for Co Wet Analysis



Microchip and Experimental Setup

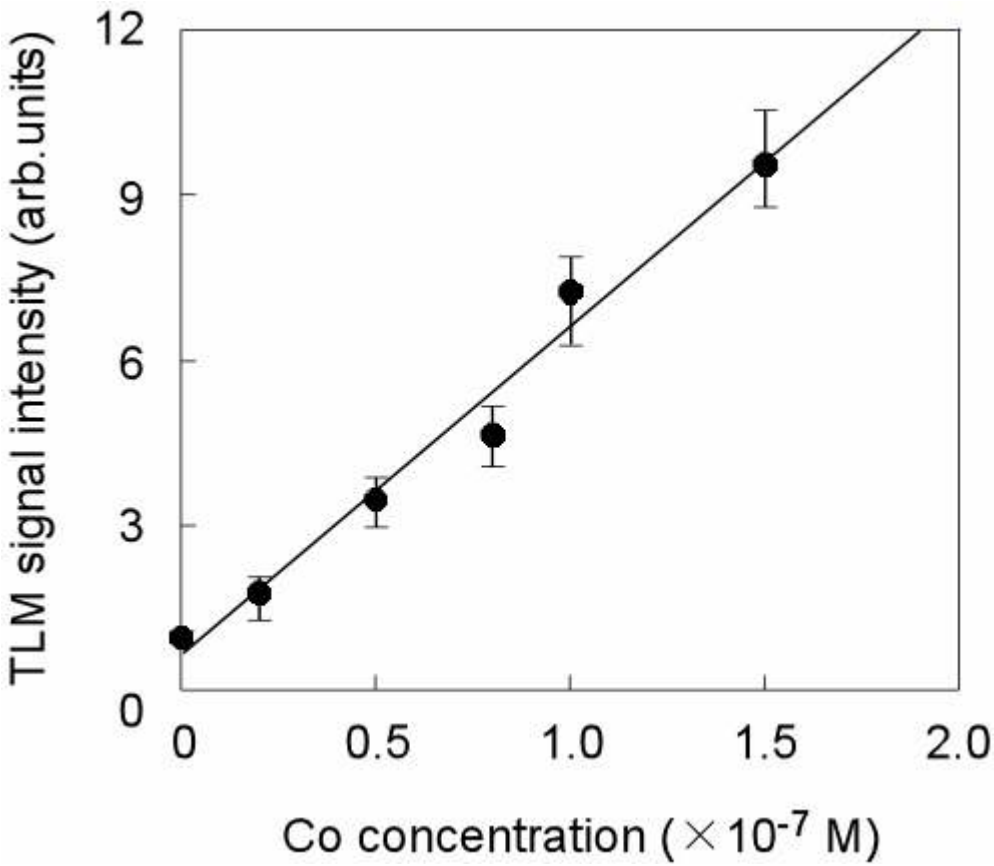


Co: Analyte Cu: Interfering



Flow velocity: 3mm/s

Calibration Curve



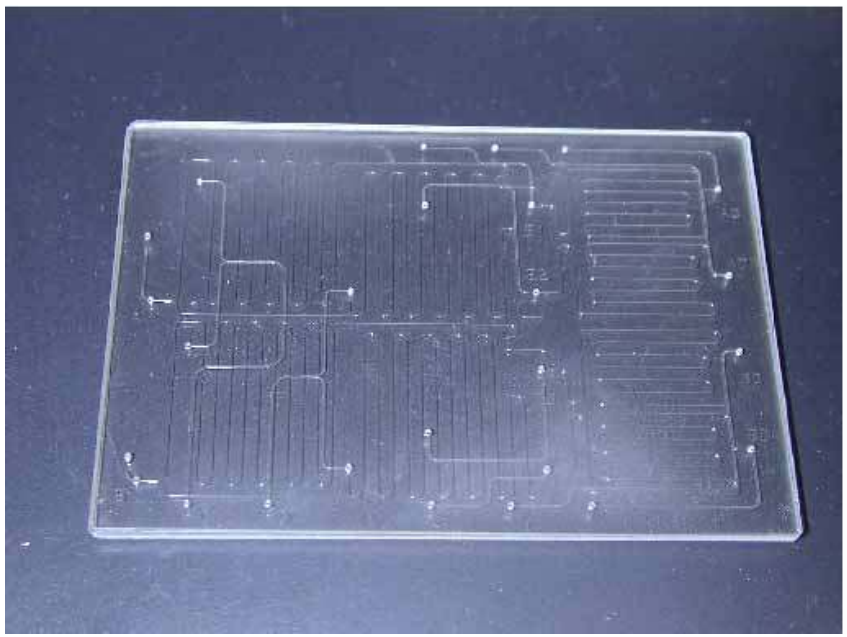
Limit of detection: 0.11×10^{-7} M

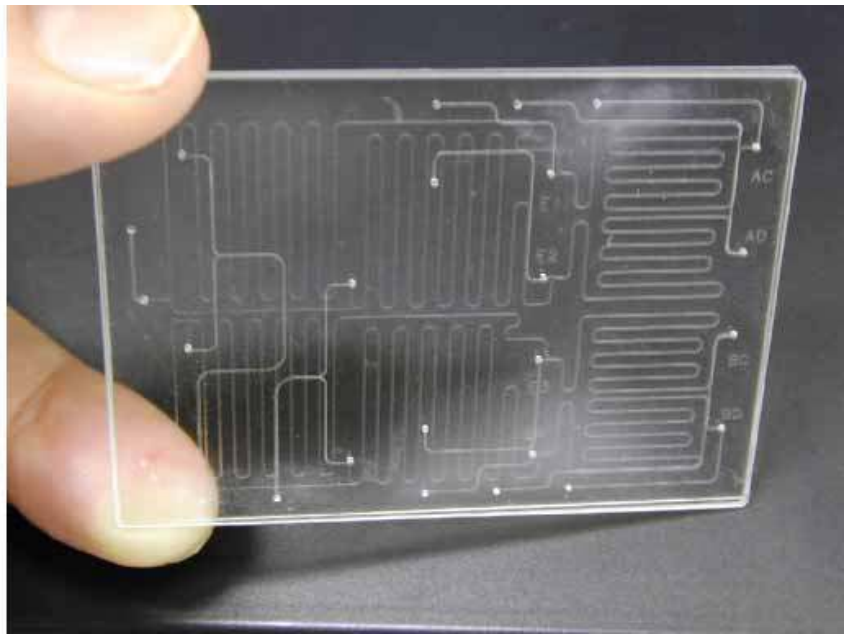
Absolute amounts of detection: 0.08 zmol

Anal.Chem., **74**, 1565 (2002)

3D CFCP (Ex. Fe & Co analysis)

Microchip With a 3-D Channel Network





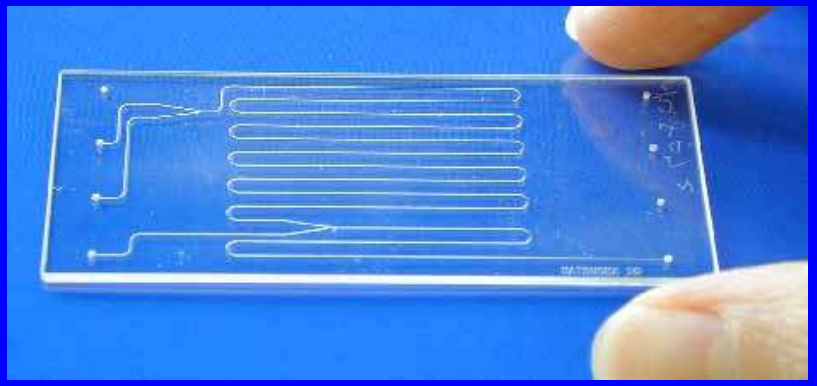
Multi-Sample Multi-Component Wet Analysis

	Sample C Fe (aq.)	Sample D Co (aq.)
Reagent A	41.0	0.6
Reagent B	0.2	12.3

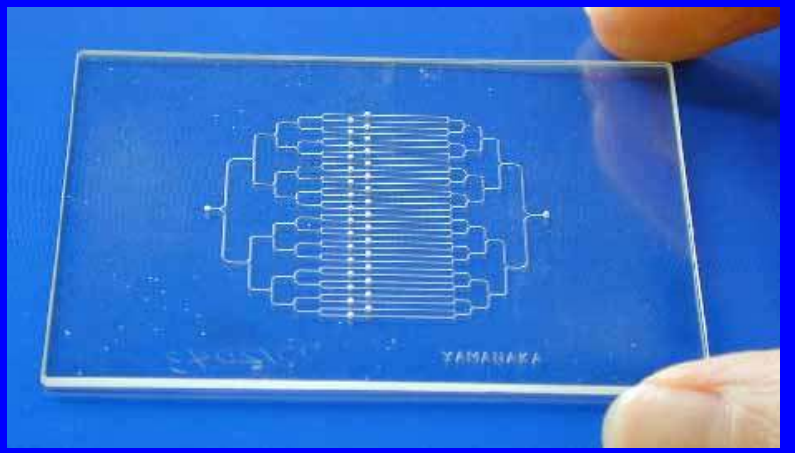
Reagent A: bathophenanthroline
Reagent B: nitroso-PSAP

Lab Chip, **4**, 328 (2004)

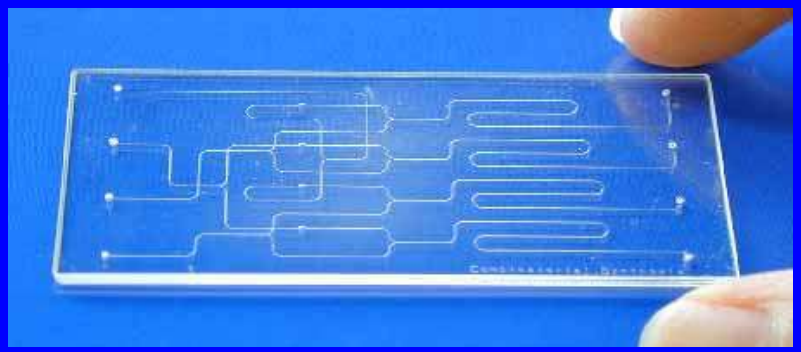
Examples of Integrated Chemical Devices



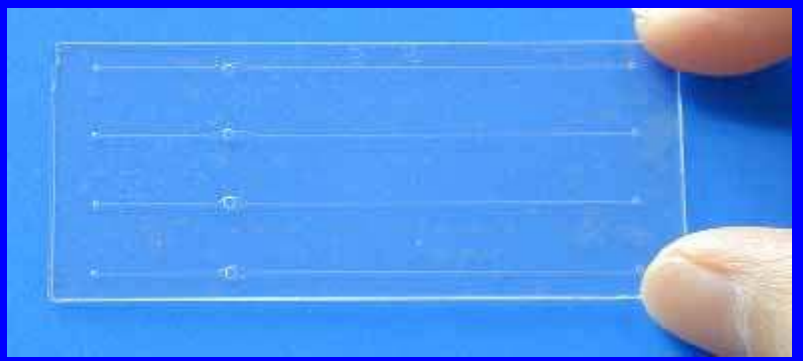
Chemical Analysis Device
- Environmental
- Biochemical



Immunoassay Device
- Cancer diagnosis
- Biochemical



Combinatorial Chemistry Device



Cell Biochemistry Device

Conclusions

- New methodology for integration of complicated chemical processing was established

- Using this methodology, we applied Co and multi-sample multi-component wet analysis system

Acknowledgements

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Thank you for your kind attention

Experimental Setup