

Microwave Chemical Co., Ltd



Microwave **Chemical**

Company

Found

2007

Location

2-8 Yamadaoka Techno-Alliance 3F, Suita, Osaka

[HQ · Basic Research]

1-6-1 Hirabayashi-Minami Suminoe, Osaka

[Manufacturing facility]

Yokkaichi, Mie

Raised Capital

US\$21Mil

Employee

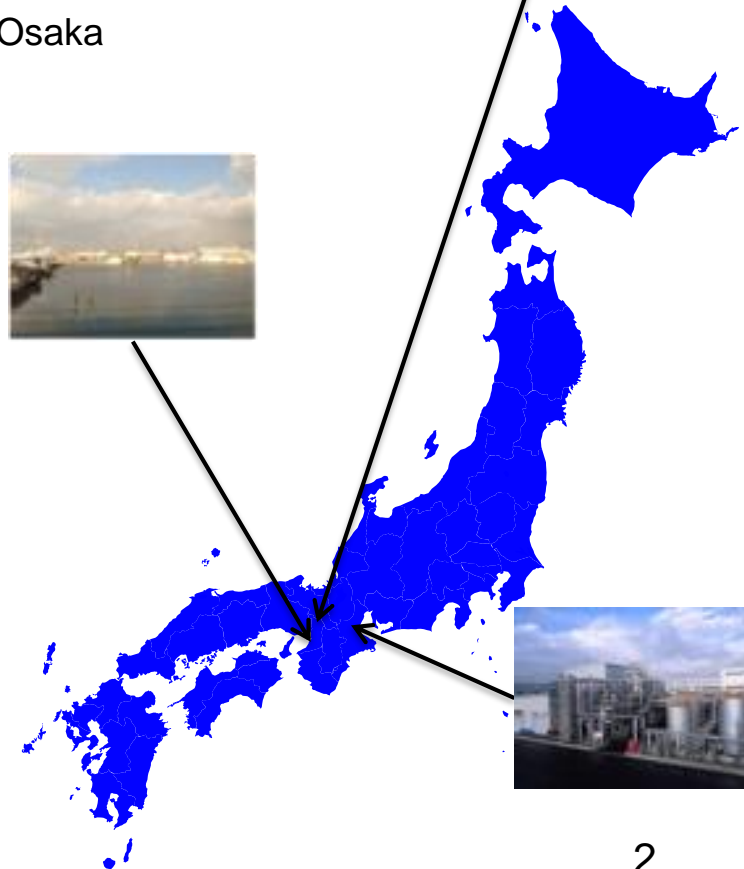
50 (12 Ph.D holders)

Product/Service

Microwave Technology

Business Domain

Chemical & Fuels



Management Team

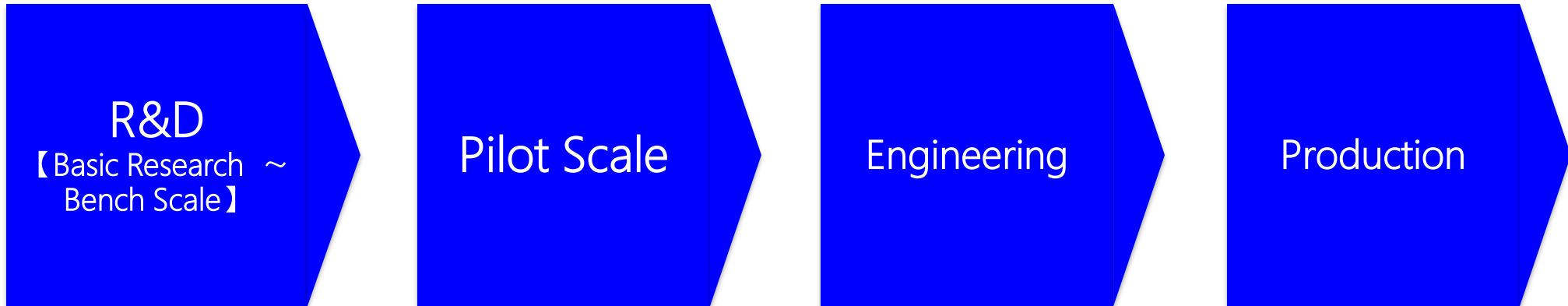
Title	Name	
Co-Founder, CEO	Iwao Yoshino	Iwao Yoshino serves as Chairman and CEO of the company. Prior to founding MWCC, he was involved in several start-ups as CEO/consultant. He started his career working for Mitsui & Co., Ltd. in the chemical department. Iwao Yoshino received BA in Law from Keio University and MBA from UC Berkeley Haas School of Business where he was Hitachi MOT fellow.
Co-Founder, CSO	Yasunori Tsukahara	Yasunori Tsukahara serves as CSO of MWCC / Associate professor of Osaka University. Yasunori received Ph.D. Graduate School of Science · Osaka University, in 2003.
Director Controller	Tomoya Shimojo	Prior to MWCC, Tomoya worked for Deloitte Tomatsu and Kringle Pharma as a director/controller. He holds BA in Business from Kobe Univ. in 1996.
GM / Engineering	Hisao Watanabe	Hisao worked as a process manager at Toyo Engineering. He holds masters in Applied chemistry from Waseda University in 1978.
GM / Production Technology	Akinori Ishizuka	Prior to joining MWCC, Akinori was an assistant professor at Okayama University. Before joining Okayama univ, Akinori worked as chief engineer for Hitachi Plant. Tech. Ltd developing water treatment technology. He received Ph.D. in Engineering, from Grad. School of Science and Tech Chiba Univ.

Business Model

- ✓ What – Microwave Platform Technology
- ✓ Who - Chemical Companies
- ✓ How - Total solution R&D ~ Engineering

Process & Product Innovation

Our Service



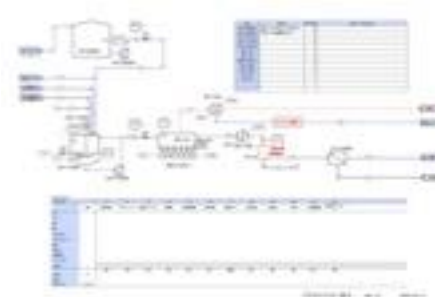
Lab.



Bench
Scale
Facility



Pilot Facility
@Osaka Factory



Process Design



Production
@Osaka Factory

From Basic Research to Manufacturing



New Process

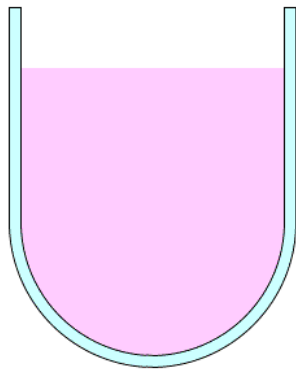


New Product

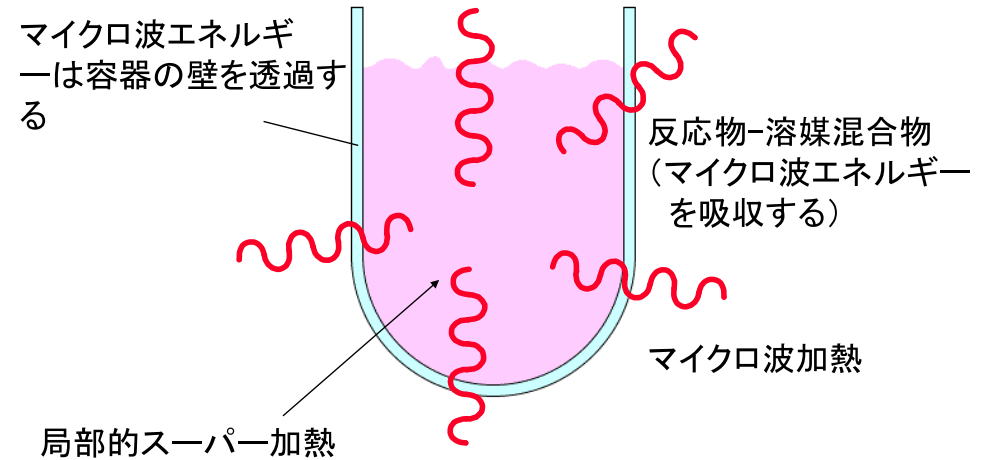
Conventional VS Microwave



C&E M

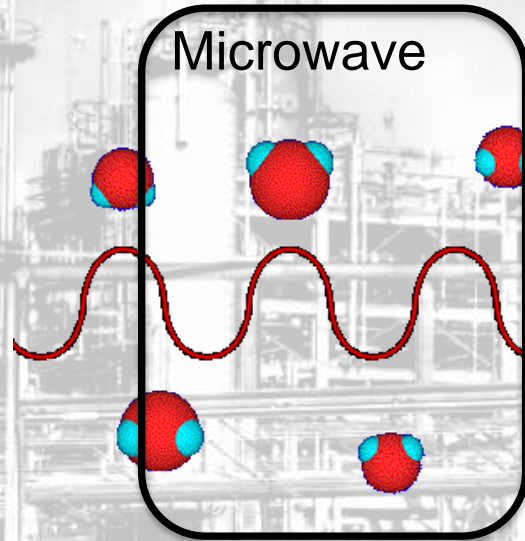
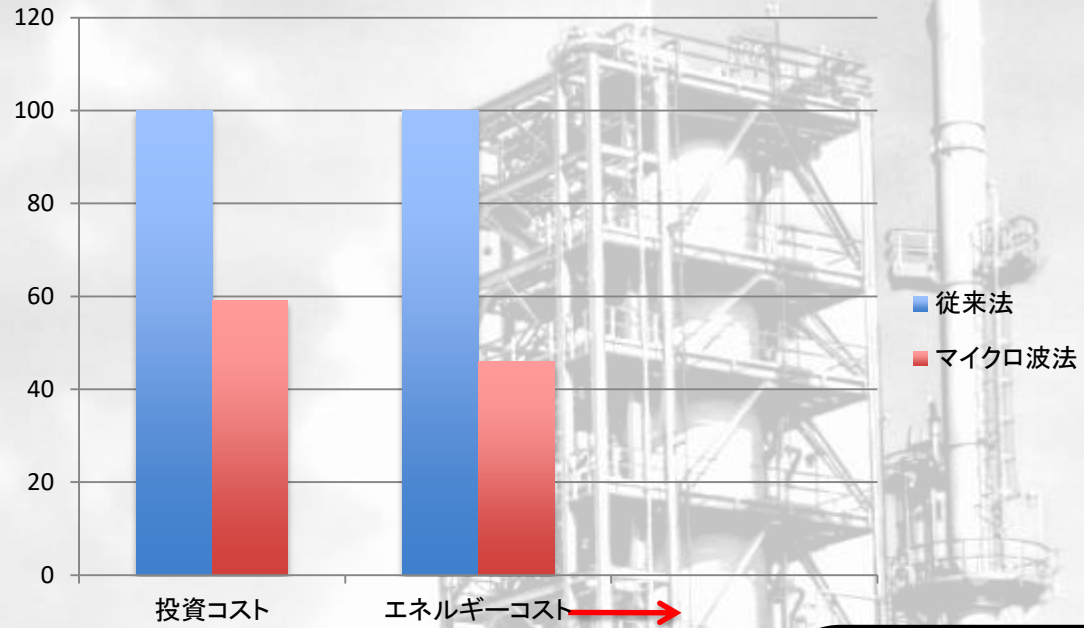


外壁温度は、液体の沸点温度よりも高くなる



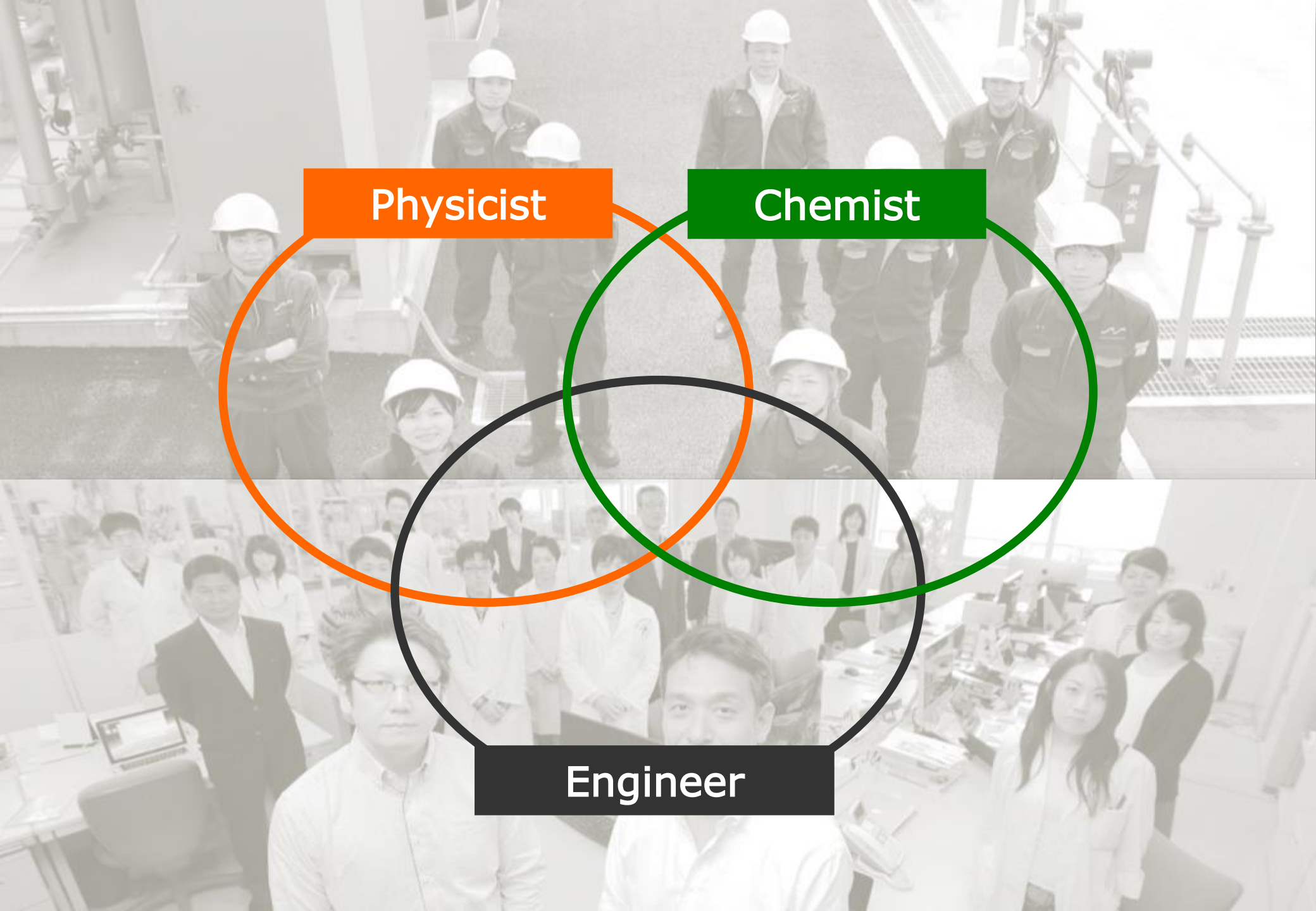
Selective、 Direct、 Uniform、 Rapid、 Internal

Design Process Based on Molecules



CEM





Physicist

Chemist

Engineer

in detail...

【 Alliance 】

- ✧ Form alliance based on product/application.
- ✧ Basically one alliance partner per product/application.
- ✧ MWCC to provide basic research to process design. Customer to provide market needs.

【 IP 】

- ✧ MWCC to provide customer with exclusive rights for the target product/application. MWCC obtain rights to sublicense the IP to other non-exclusive target.

【 Revenue Model 】



R&D Phase

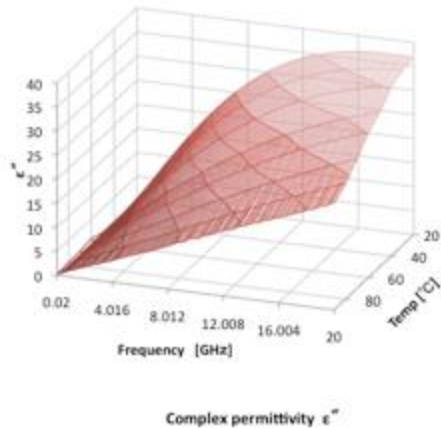
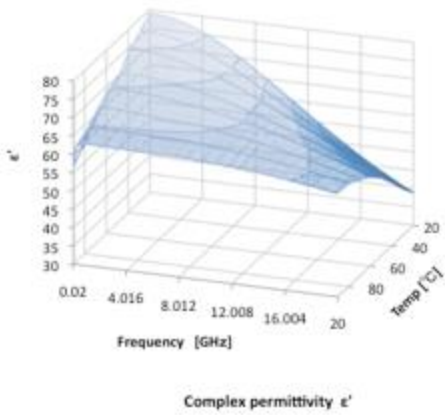
- ✧ R&D fee based on milestone payment.

Business Phase

- ✧ License model : lump-sum payment + running royalty
- ✧ J/V model: ①License fee、②Profit from Business、③Capital gain from J/V investment.

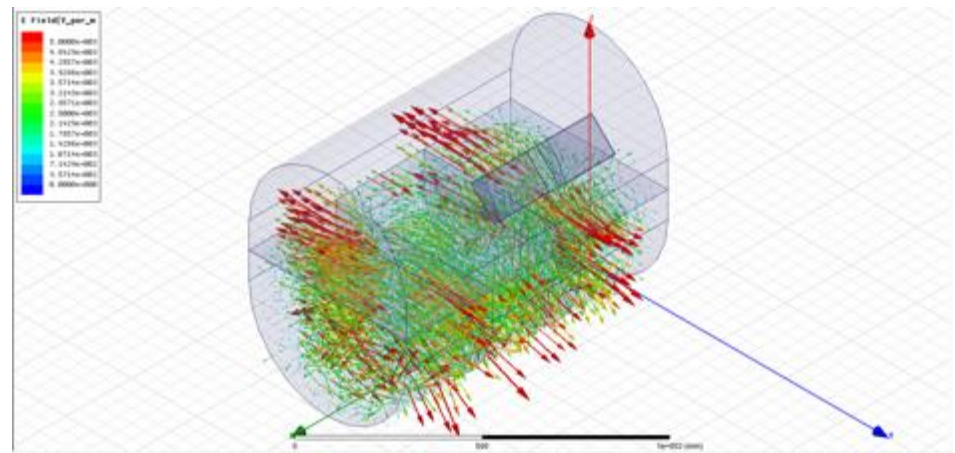
Science

How to design the reaction - temperature, frequency, what compounds to use in the reaction, etc.



Engineering

How to convey & distribute microwave into the reactor – simulation, material, etc.



Trial & Error

Lab Scale



2t/d
[Reactor G#1]



2~4t/d [Reactor
G#2]



Test Reactor
[Reactor G#3]*



12~14t/d
[Reactor G#4]**



10t/d
[Reactor G#5]



- ◆ Internal Structure
- ◆ MW Irradiation from bottom (hybrid irradiation)

Diameter (mm)	200	400	800	800	600
Length (mm)	2,000	2,000	1,200	3,000	5,500

Delivery	Mar 2010	Mar 2011	Dec 2011	Mar 2012	Aug 2013
Application	BDF	Chemical	Chemical	Chemical	Chemical
Current status	Experimental use @ Saito Lab	Commercial use @ Kobe	Commercial use @ Osaka	Experimental Use @ Osaka	Commercial use @ Osaka



*Initially experimental use, currently supplemental reactor @ Osaka

**Experimental use @ Osaka.

MWCC Microwave Scale-up Process

Pase I: Lab



5-500 ml / batch



Pase II: Bench



5-20 L / reactor



Pase III: Pilot



50-200 L / reactor



Pase IV: Factory



500-2000 L / reactor
throughput : 2,000-20,000 T / y

Make Wave, Make World.

