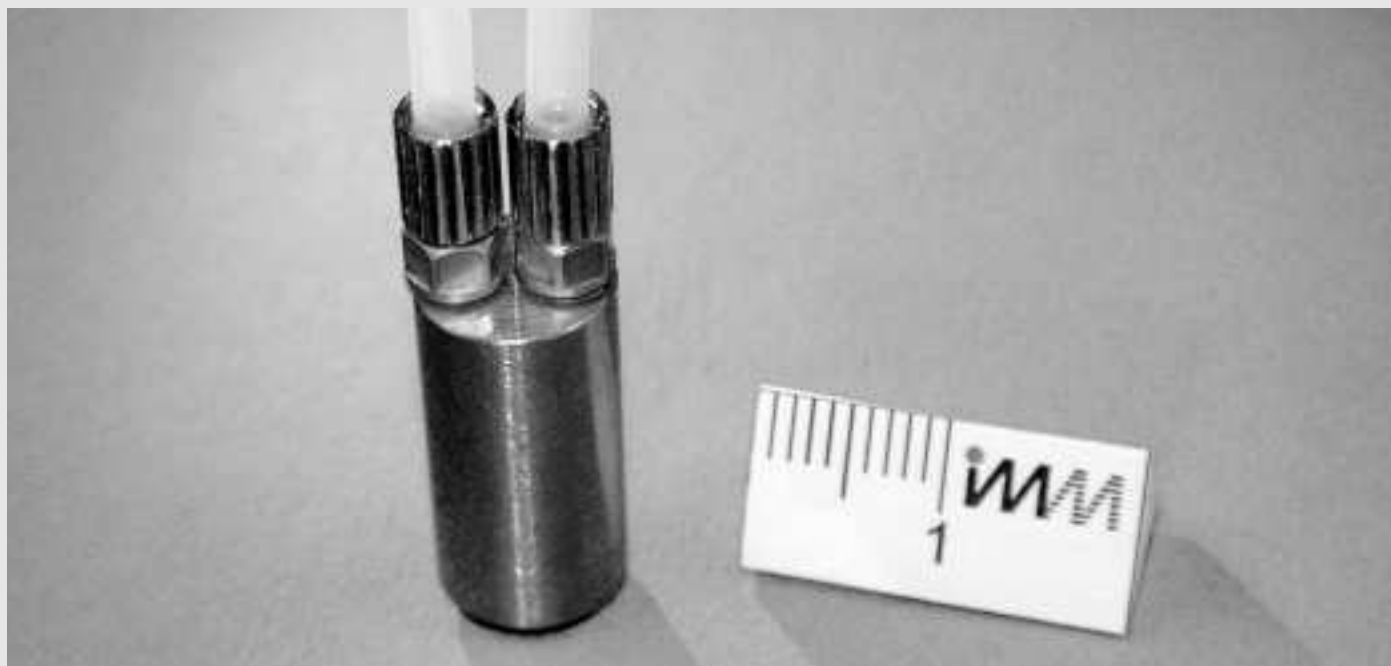


# IMPINGING-JET MICRO MIXER

IJMM



*Impinging-Jet Micro Mixer*

## Principle

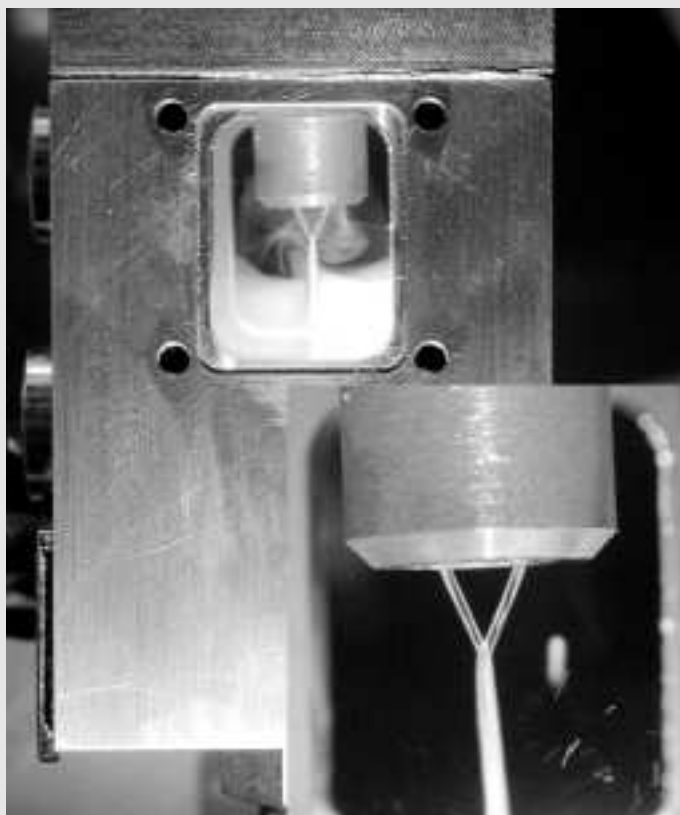
Deliberately slow mixing is an issue when fast mixing would have deleterious effects on processing, e.g. by plugging the whole system. As a matter of fact, most organic processes are associated with more or less precipitation during the course of reactions. Particle generation is simply not possible in the vast majority of today's micro devices.

For this reason, a specialty mixer was developed that performs mixing in a "wall-free" environment, i.e. by two pump-driven, falling jets merging into one in a Y-shaped configuration. It was shown that the smaller the jet diameter, the better the mixing quality. Intense knowledge on jet configuration as a function of flow rate and jet diameter has been documented, in addition to mixing quality judgement.

As a result, the nozzles of the jet mixer have tiny, only 350  $\mu\text{m}$  wide nozzles. The mixer has been tested for inorganic reaction processing such as calcium carbonate precipitation and organic reaction that are associated by strong fouling. The aminolysis of acetyl chloride with n-triethylamine in THF leads to instantaneous heavy precipitation. This reaction hardly can be handled in any other micro device. It is an extreme representative of many other organic reactions that suffer more or less from fouling, e.g. like quaternizations.



3 different flow patterns:  
• Y-type jet of IJMM (top)  
• Fan-shaped jet (middle)  
• Fanned-out jet (down)



*IJMM in a special funnel-like housing for particle production*



*Geometric parameters determine the mixing performance, beside flow parameters*

### Technical Data

|   |  |
|---|--|
| Name                                    | Impinging-Jet Micro Mixer                                  |
| Order number                            | IJMM   |
| Mixing principles                       | Jet collision  |
| Size (L x B x H)                        | 10 x 35 x 10   |
| Connectors (Inlet/Outlet)               | 1/8" / 1/8" Clamp screw                                    |
| Standard boring-/nozzle diameter d (µm) | 350, 500, 1000   |
| Orientation angles (d)                  | 45°, 60°, 90°  |
| Standard material                       | 1.4571   |
| Options                                 | Other materials like Hastelloy, Monell or Titan on request |

### Operating Conditions

|                          |                      |
|--------------------------|----------------------|
| Temperature (°C)         | -40 – 220            |
| Pressure stability (bar) | 10                   |
| Flowrate (l/h)           | 0.5 – 3              |
| Residence time (ms)      | 0                    |
| Inner volume (µl)        | 0                    |
| Max Viscosity (mPas)     | 100                  |
| Leakage Class            | < L <sub>0.001</sub> |