

ウルトラファインバブルを用いた太陽電池用シリコンウエハの分離

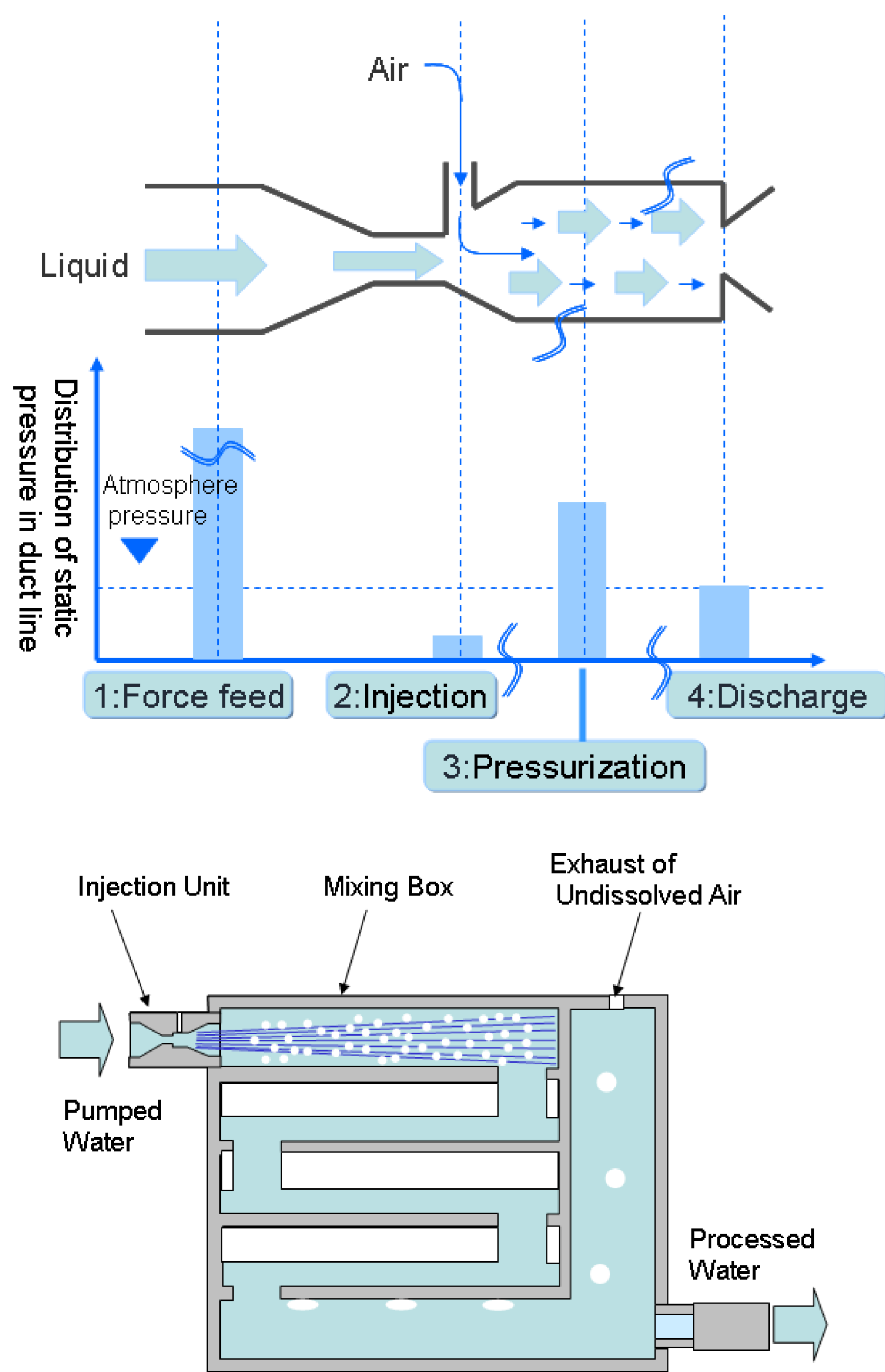
Silicon wafer separation for solar cells using Ultrafine/micro-bubbles

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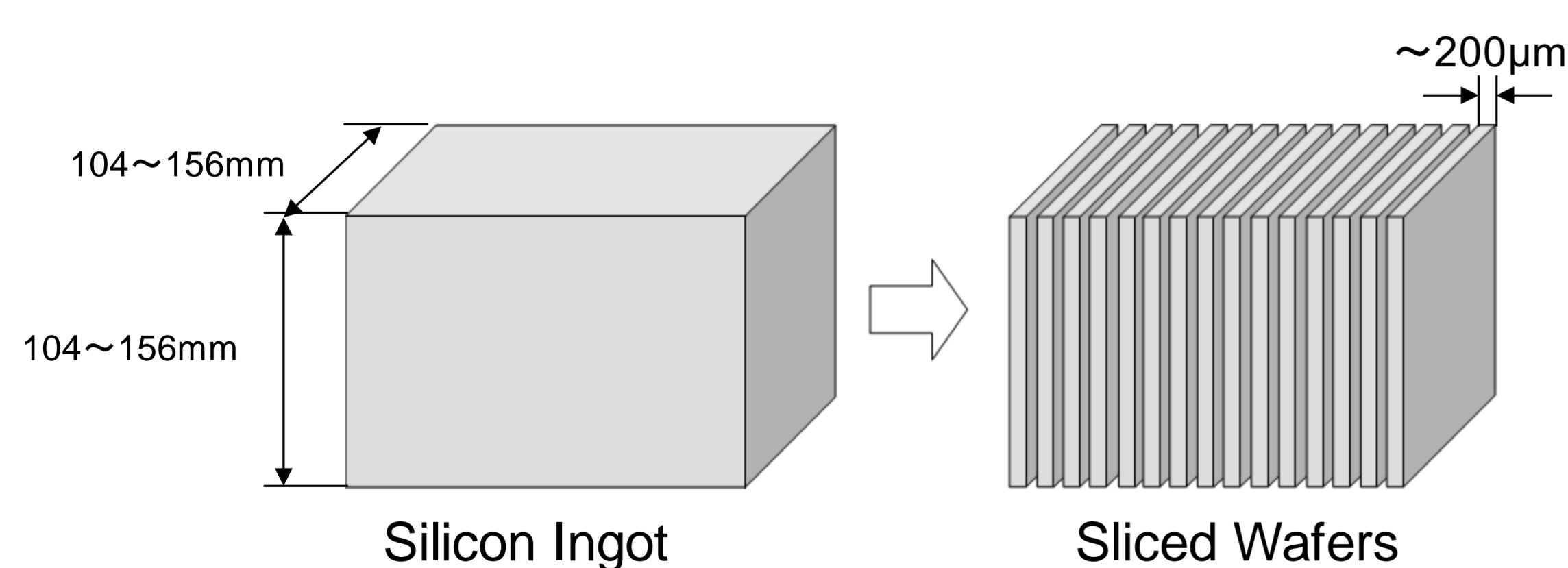
Abstract

We have studied micro-bubble generation technology since 1990 as GALF (Gas Liquid Foam) technology. More than two hundred applications have proven mostly in the field of environmental applications, such as water and soil purification. A unique application applied recently is solar cell silicon wafer separation. Stacked solar cell wafers down to 200 μm thick can be gently separated by micro-bubbles. Oversaturated water can immerse into the gaps of stacked wafers and micro-bubbles are generated. Micro-bubbles, grown at the gaps of wafers, can separate wafers and reduce friction.

GALF (Gas Liquid Foam) Technology



Background of Solar Cell Wafer Separation



Silicon wafers for solar cells are sliced from ingot.
These wafers are washed in water.
These wafers easily stick each other.
Wafer separation is critical for good yields.

Cost pressure of solar cells is very critical

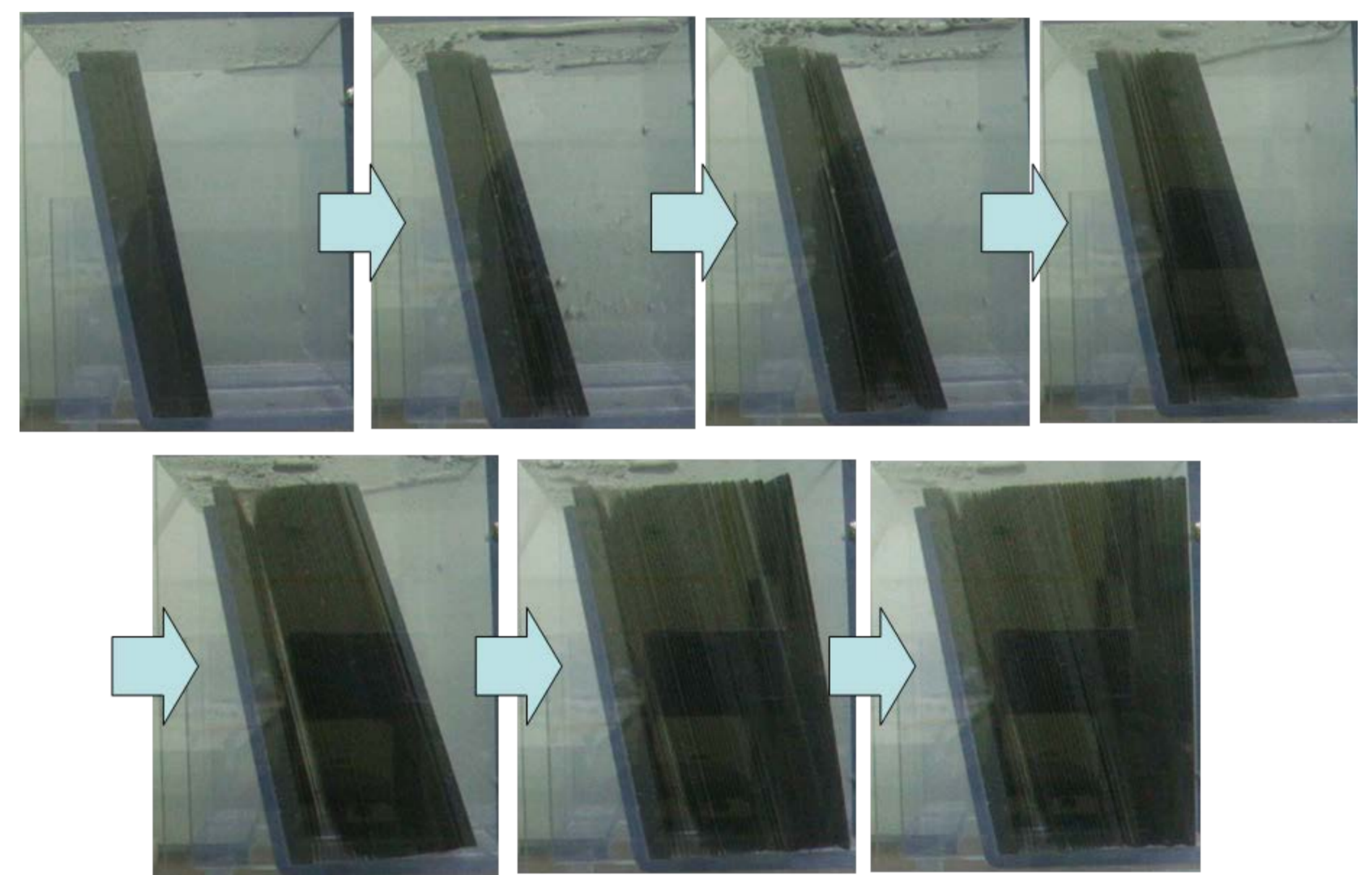
\$xx/W

→ solar cell wafers are to be thinner and thinner

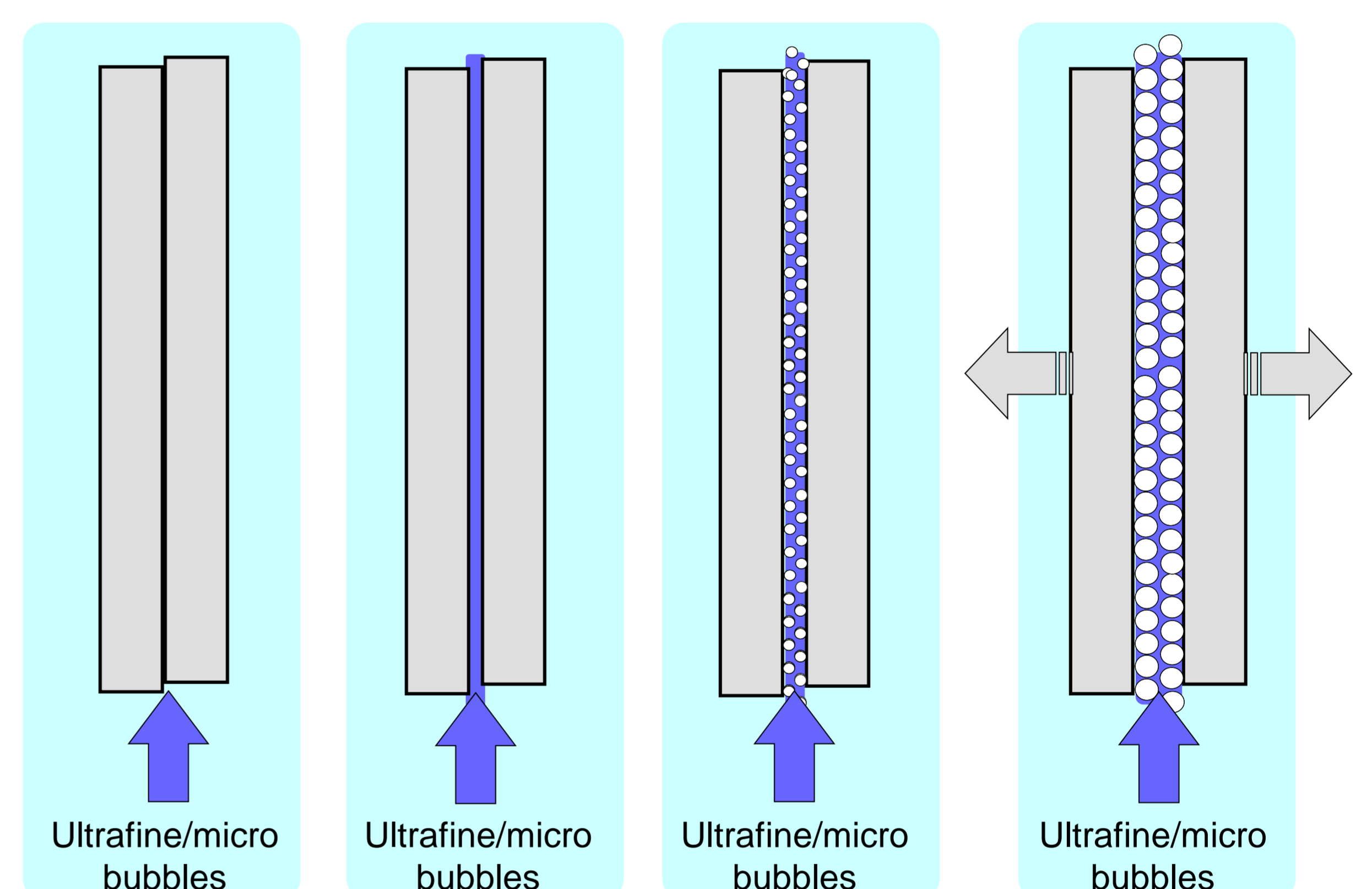
200 μm or less

→ solar cell wafers became very fragile

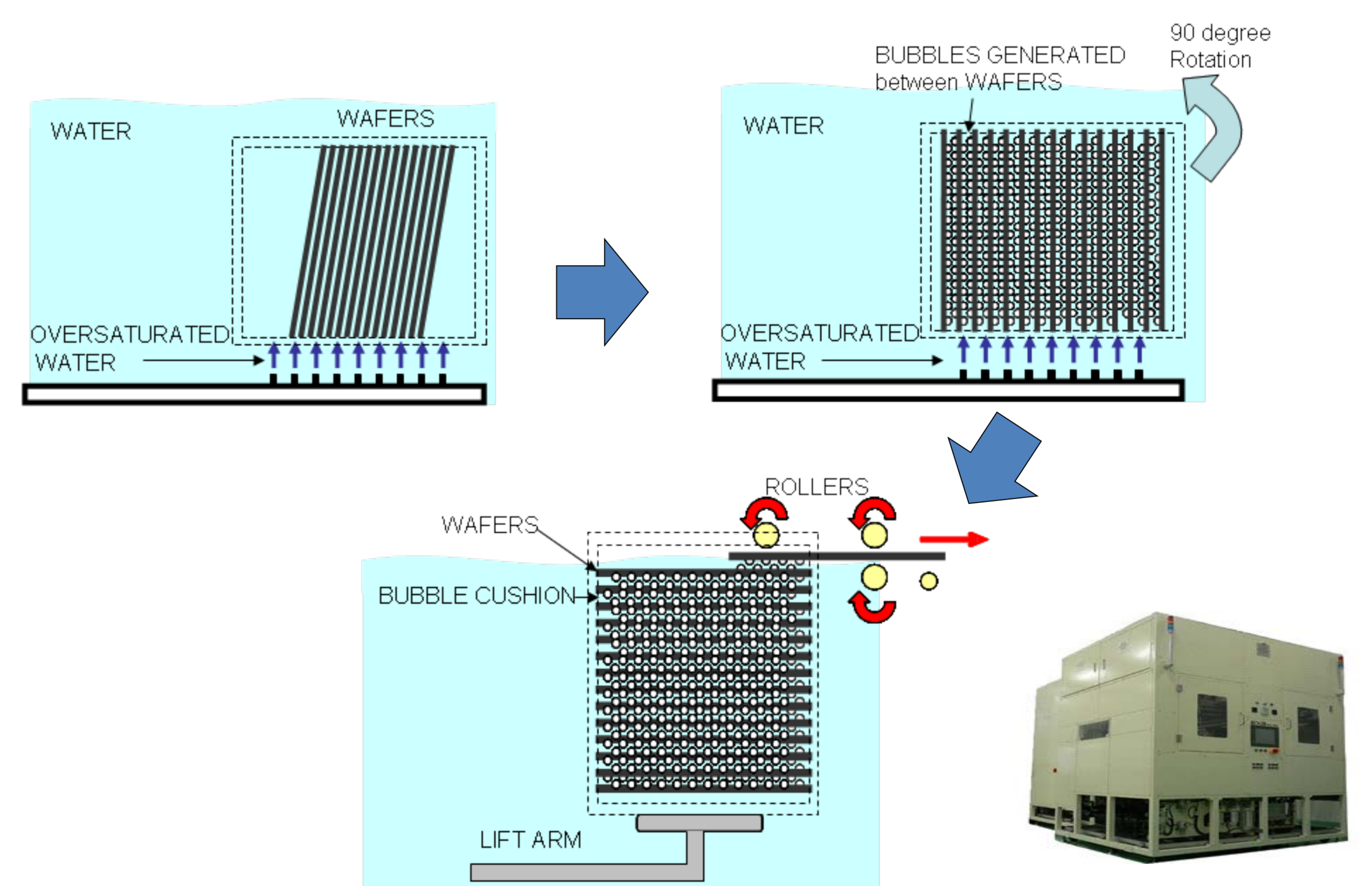
Preliminary experiment of solar cell wafer separation with Ultrafine/micro-bubbles



Mechanism of stacked wafer separation with Ultrafine/micro-bubbles



Solar cell wafer separation sequence



Summary

Solar cell silicon wafer separation can be done using GALF technology.

Oversaturated water generated with GALF system can penetrate into the gaps of wafers, then micro/Ultrafine-bubbles are generated between wafers. These bubbles grow with additional oversaturated water blow. The wafers are gently and smoothly separated with bubble cushion.