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# TOWARD IMPROVED FOWLP MANUFACTURING BY USING SELF-ALIGNMENT PROCESS

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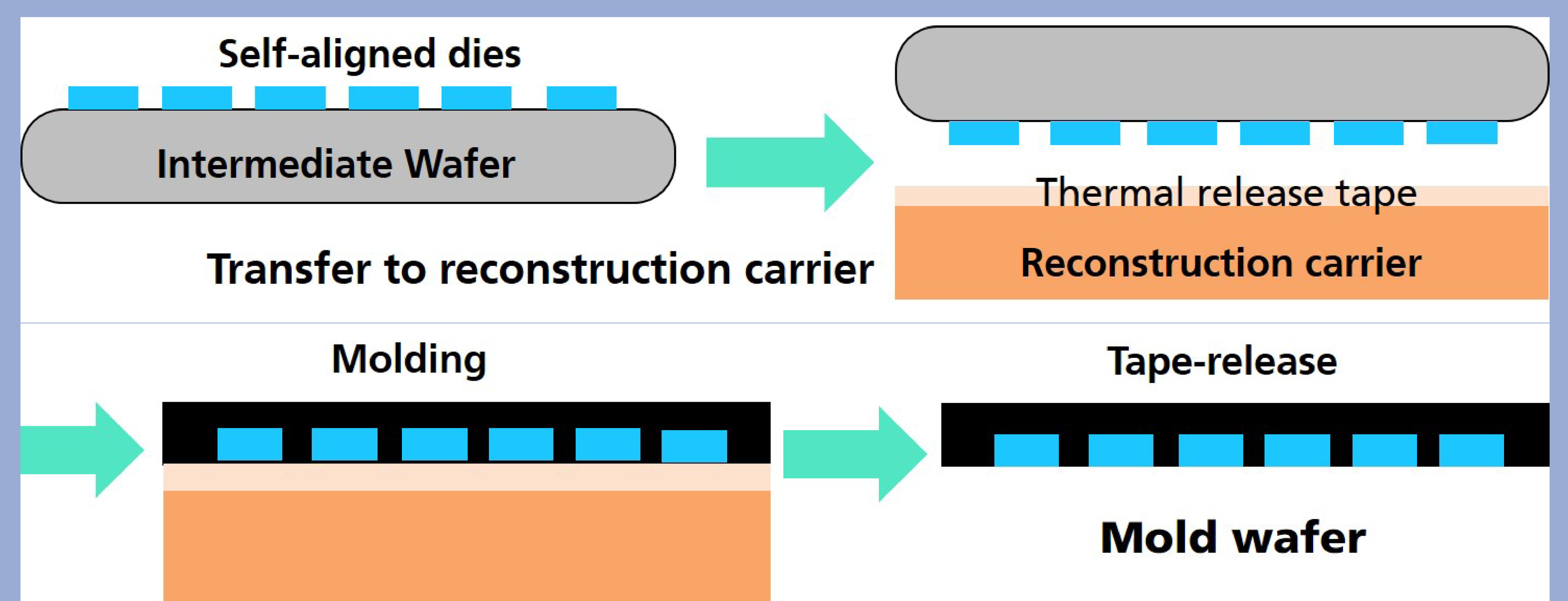
## SELF-ALIGNMENT

Self-alignment is based on adjusting the wetting properties of a substrate surface by low-pressure fluorine plasma: metal areas become hydrophilic while the surrounding polyimide area becomes hydrophobic. Dies are fixed to the target areas by a liquid.




FOWLP with self-alignment process

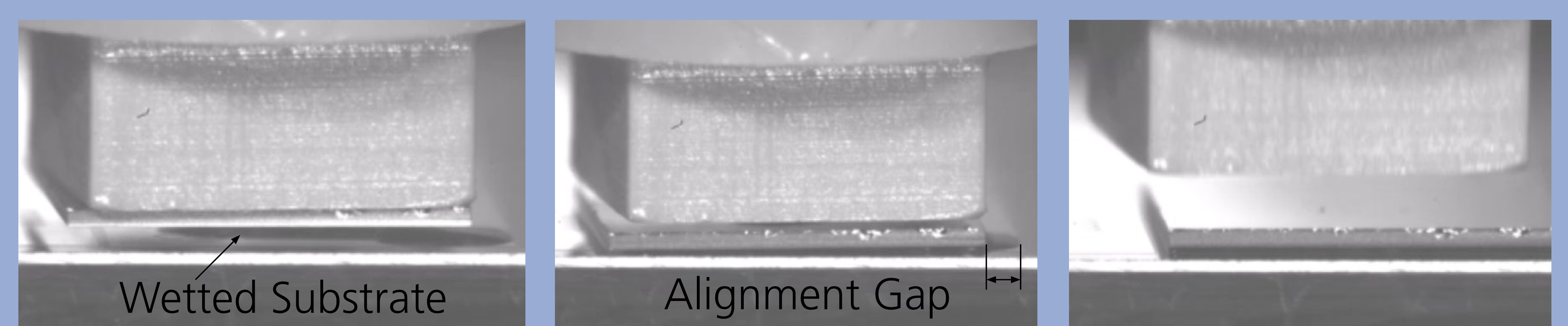
## PROCESS PARAMETERS

### Assembly liquid

- **Formulation** has to guarantee adhesion before carrier transfer process and must allow for easy release after transfer process
- Dispensing **volume** influences process time, „floatability" of chips, risk of overflow

**Chip thickness** – influences floating behavior

Hydrophilic property of **plasma treatment** is time-dependent



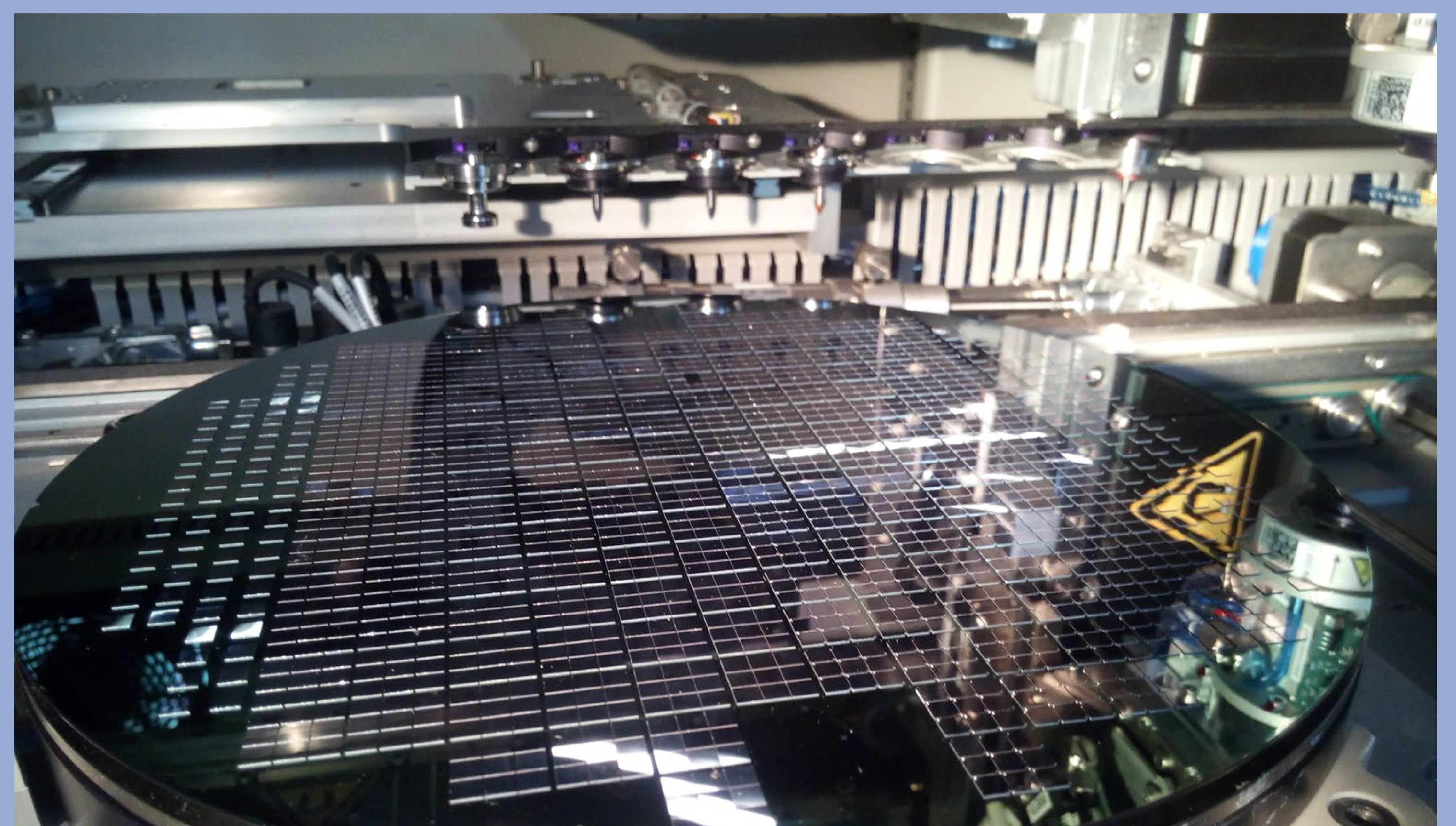

P&P tool holds the die above the wetted bonding position | Die is left to float on the liquid | Die aligned to the bond position

## PROCESS CHAIN

- Plasma treatment of the intermediate carrier wafe
- Dispensing of assembly liquid onto target areas
- Pick & place of dies without contacting target areas

## DISCUSSION AND OUTLOOK

Self-alignment of dies in the context of a total FOWLP process was demonstrated successfully. IR evaluation shows that self-alignment accuracy is comparable to the standard pick & place process with the potential to outperform standard pick & place. Future developments focus on the potential of self-alignment to increase assembly throughput (UPH) drastically by implementing multi-die handling tools. This makes self-alignment a promising approach in FOWLP manufacturing.



Fullwafer P&P by self-alignment