# Manufacturing Capability of Micro-Transfer Printing

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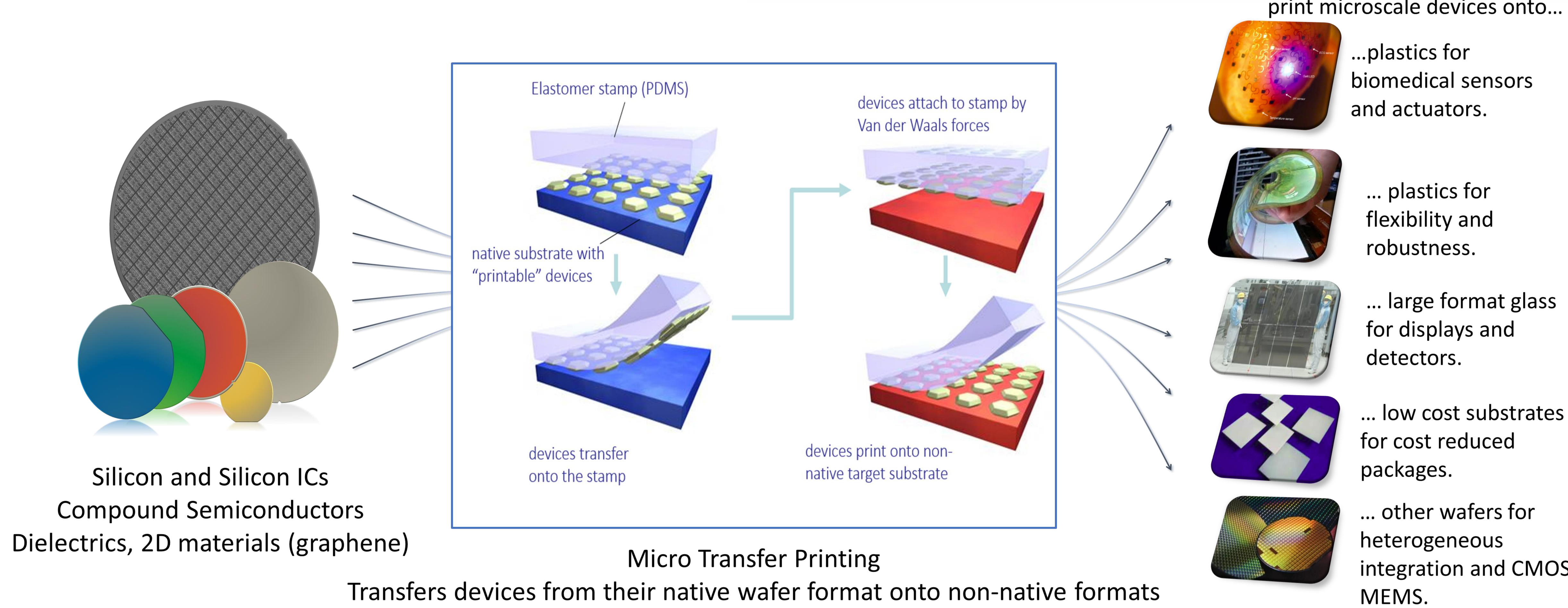
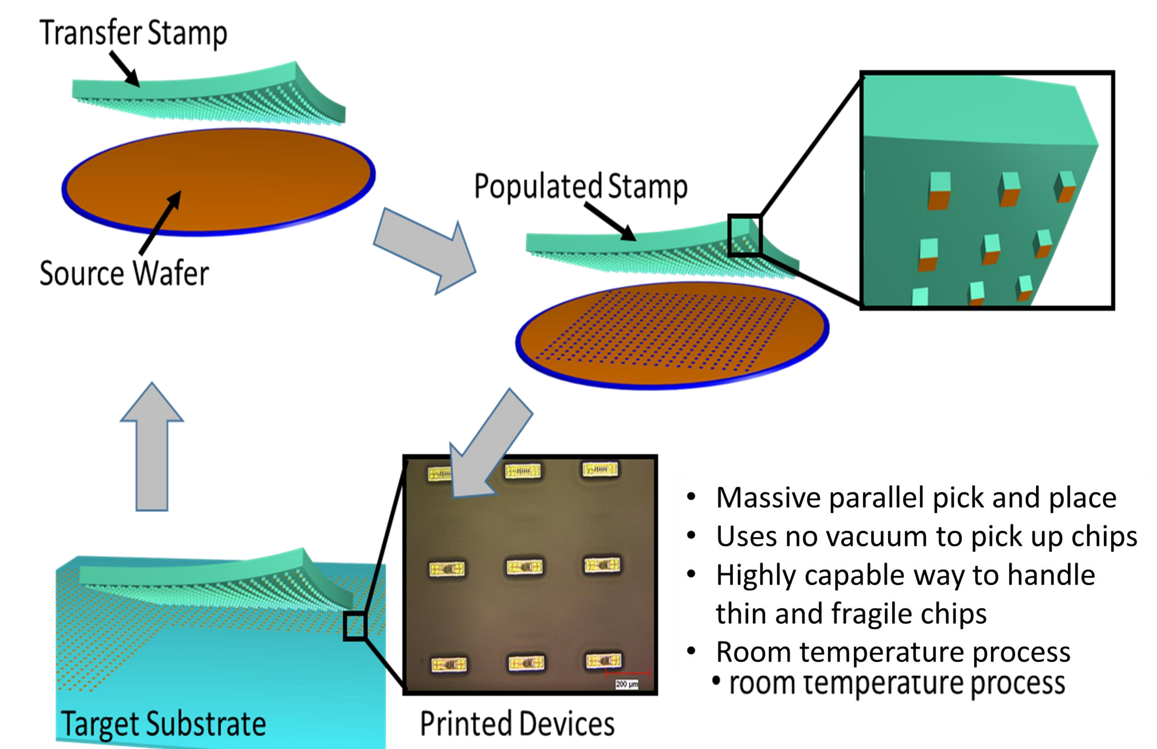
## Micro Assembly Unlocks New Opportunities for Wafer Fabricated Devices



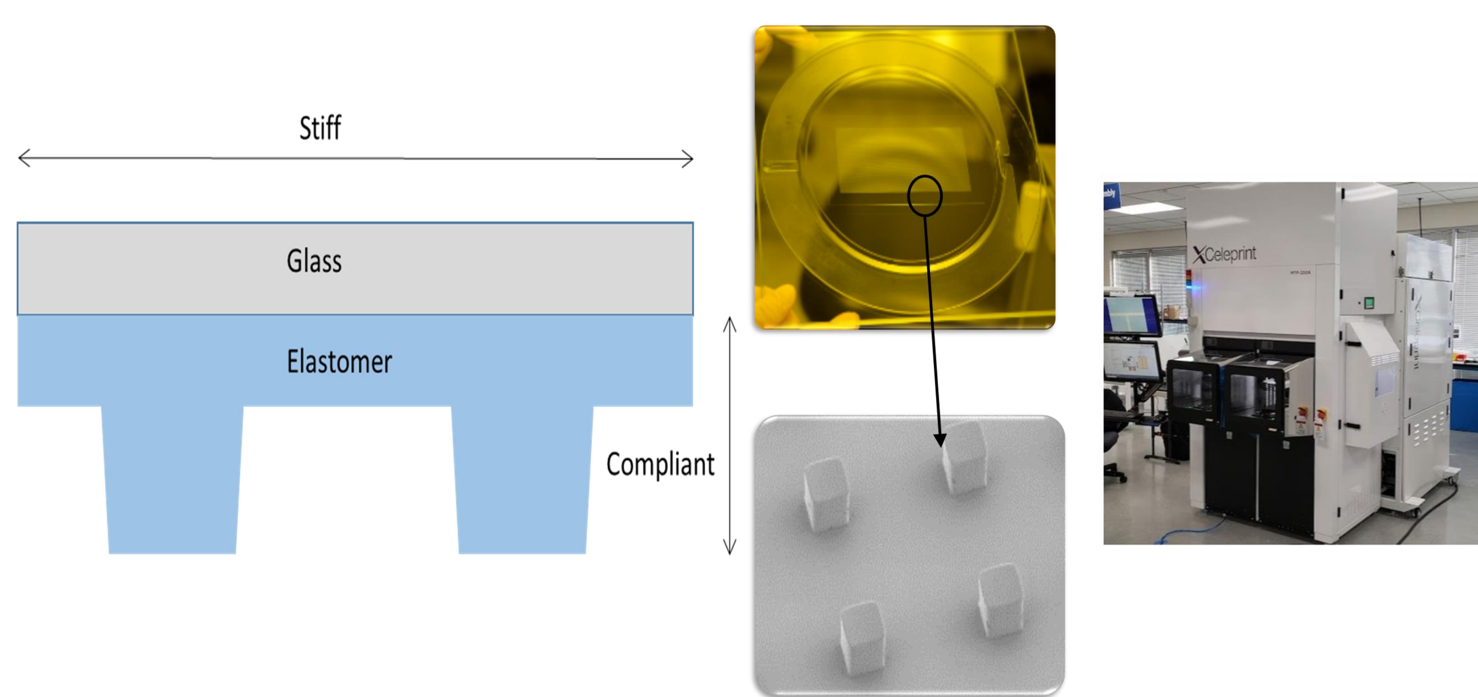

Silicon and Silicon ICs
Compound Semiconductors
Dielectrics, 2D materials (graphene)

Micro Transfer Printing
Transfers devices from their native wafer format onto non-native formats

## How it works




## Microscale manipulation with macroscale scalability

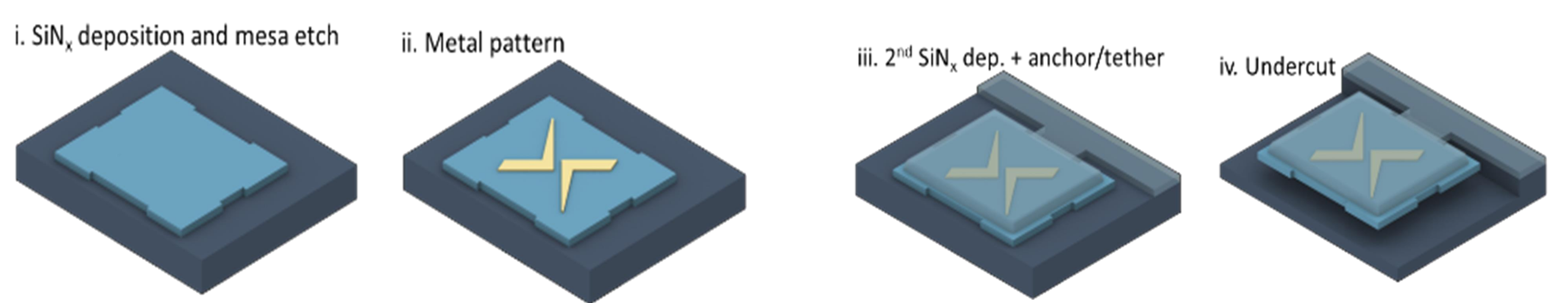


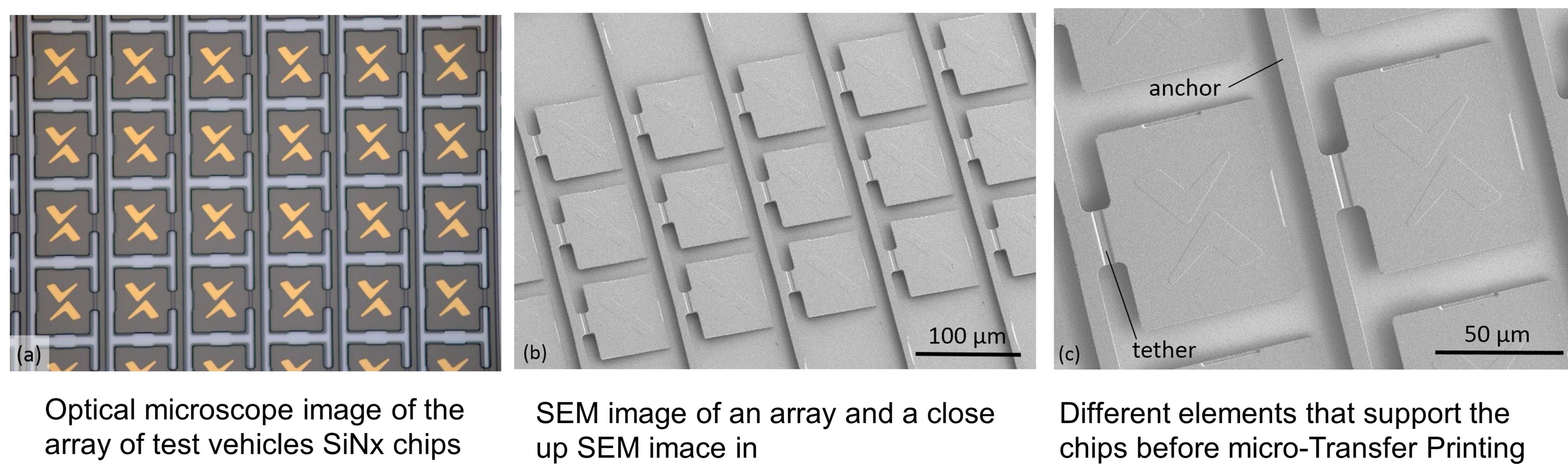

- Naturally compliant in the Z Direction: contacts real-world surfaces over large areas
- Laterally stiff: maintains lateral registration
- Soft contact: Ideal for handling fragile & thin semiconductor devices
- Transparent: Facilitates optical alignment through the stamp during printing
- Low cost: Injection molded with inexpensive materials (glass & silicone)
- Robust: Demonstrated 10's of thousands of print cycles without degradation

## Test Vehicles

- SiNx test chips were generated out of on a silicon surface
- Chips were then released and used for transfer testing.

**Process Flow**



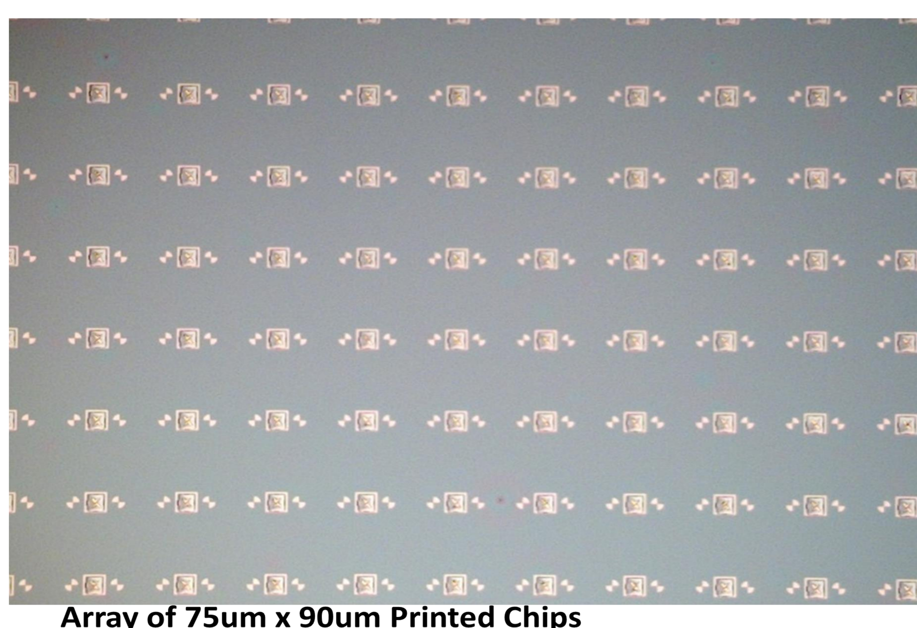

Optical microscope image of the array of test vehicles SiNx chips

SEM image of an array and a close up SEM imace in

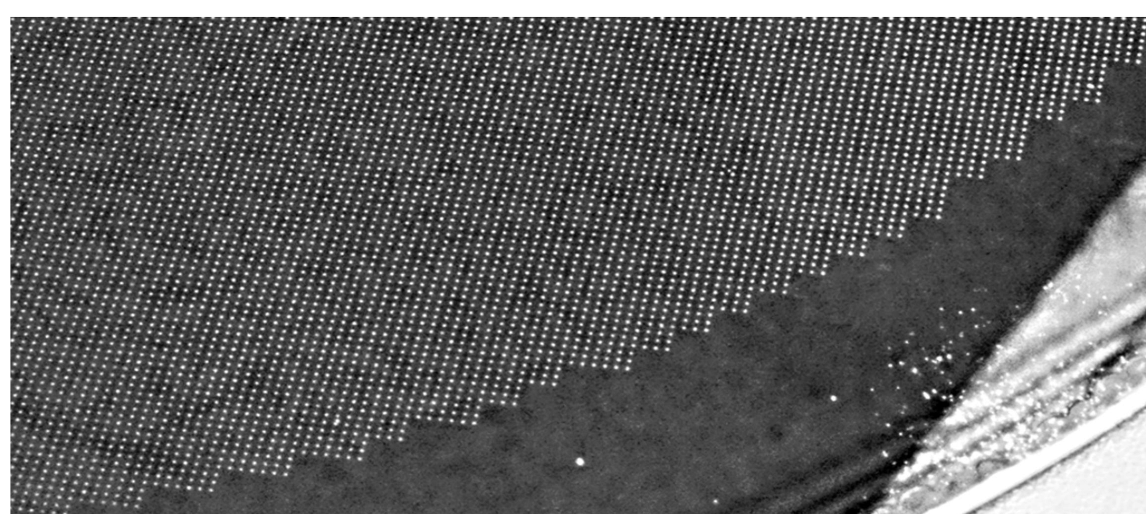
Different elements that support the chips before micro-Transfer Printing

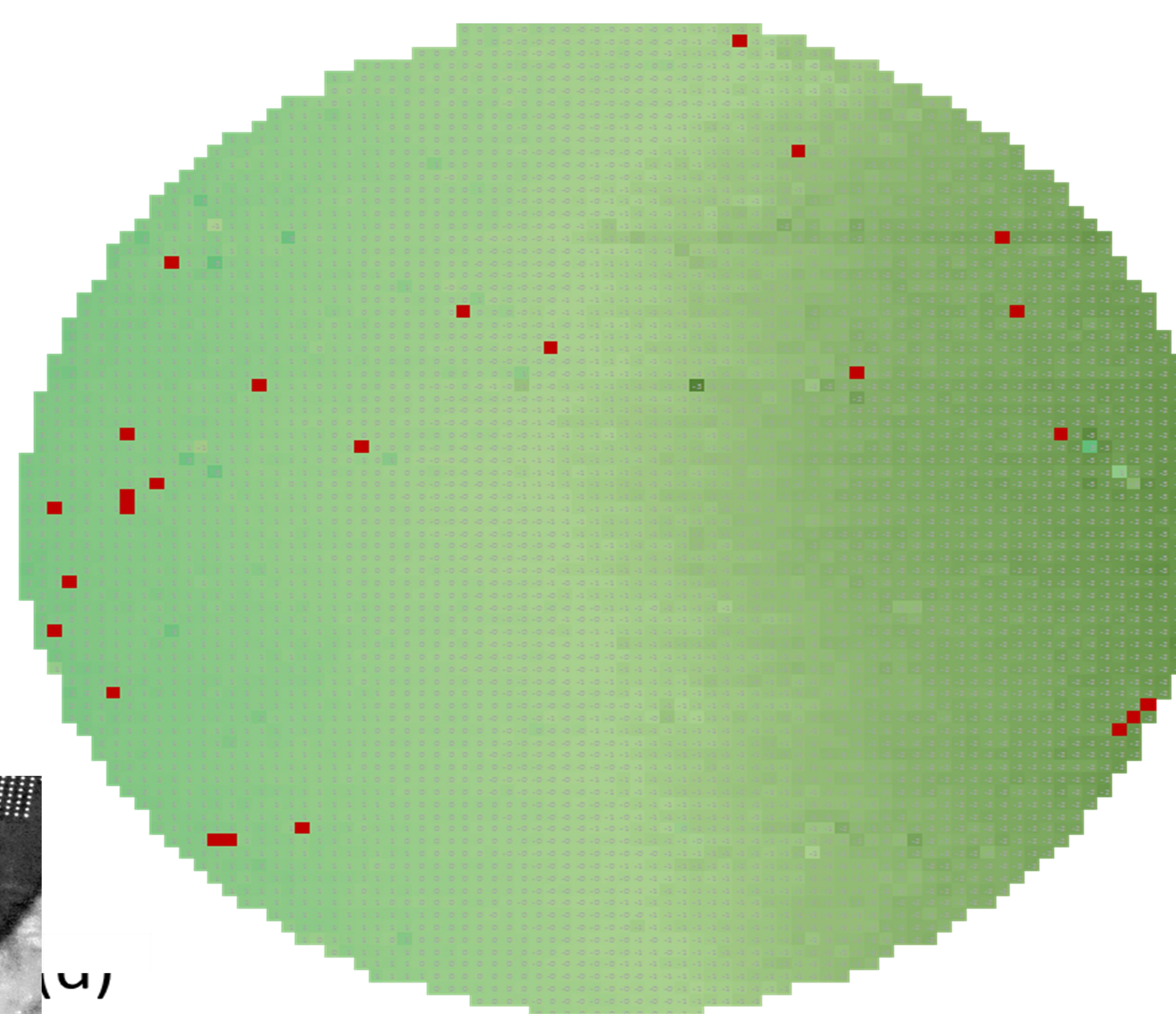
## Populating a 150mm wafer in 1 print cycle

- More than 82,000 chips transferred in 1 cycle
- Demonstrated transfer yield of 99.94%

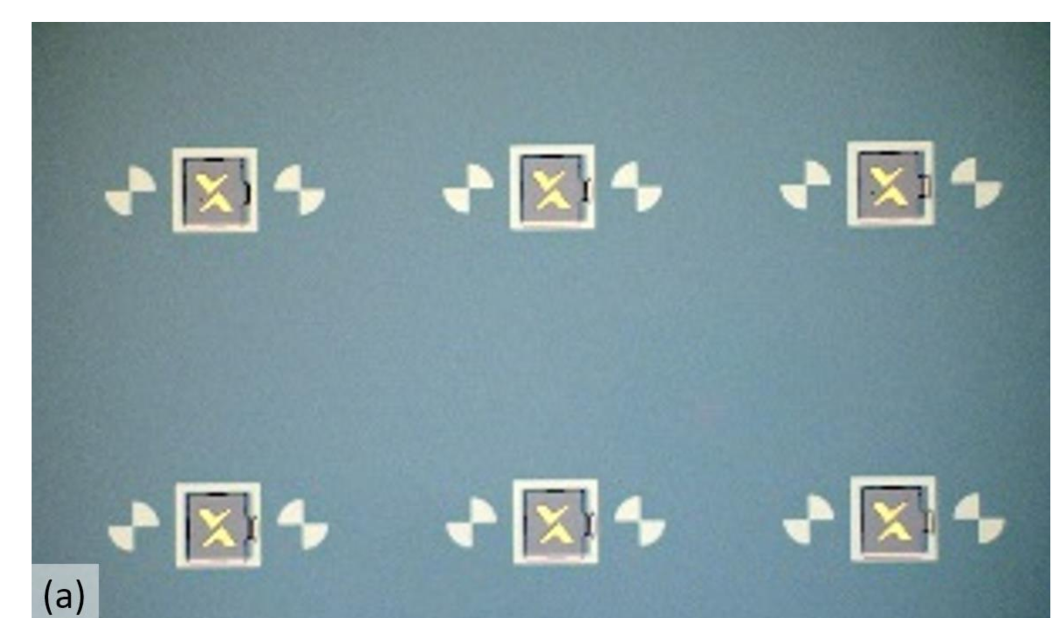


**Array of 75um x 90um Printed Chips**





**Yield Map of Printed Wafer**

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