

## Abstract

A recently proposed rapid system prototyping technology based on a WSI active configurable circuit board is capable of programmably interconnecting integrated circuit packages deposited on its surface, which comprises over one million contacts. This technology has some similarity but also some key distinctive constraints when compared to conventional printed circuit boards. Since manufacturing a full wafer is highly expensive, a 2.5mm<sup>2</sup> testchip and a 200mm diameter development wafer have been manufactured to validate the waferIC™ concept. The testchip has been used for digital signal propagation validation while the development wafer has permitted the electrical testing and validation of Through Silicone Vias (TSVs) interconnection technology. Besides, thermal-mechanical simulation of different parts of the WaferBoard™ has been presented.

## Application

- **Programmable Prototyping board** for mainly digital applications
- **Accelerate** by two orders of magnitude **prototyping time**, reducing time-to-market and inducing cost-saving
- Huge routing capacities, very flexible to user requirements

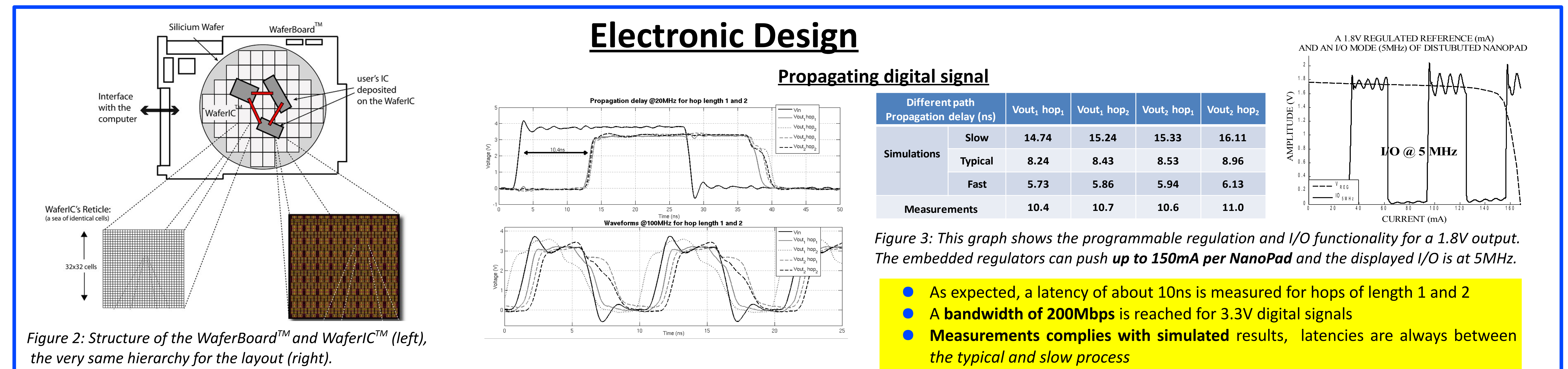
## Context

- A **Reconfigurable Circuit Board** called **WaferIC™**, which can be larger than a reticle - ultimately a whole wafer - is in development
- **WaferIC™** can have several millions of tiny conducting pads (50µm x 50µm) called **NanoPads**, **over three orders of magnitude denser** than the most complex IC package
- **Any IC package**, with varying spacings and patterns can be **placed anywhere on the surface**

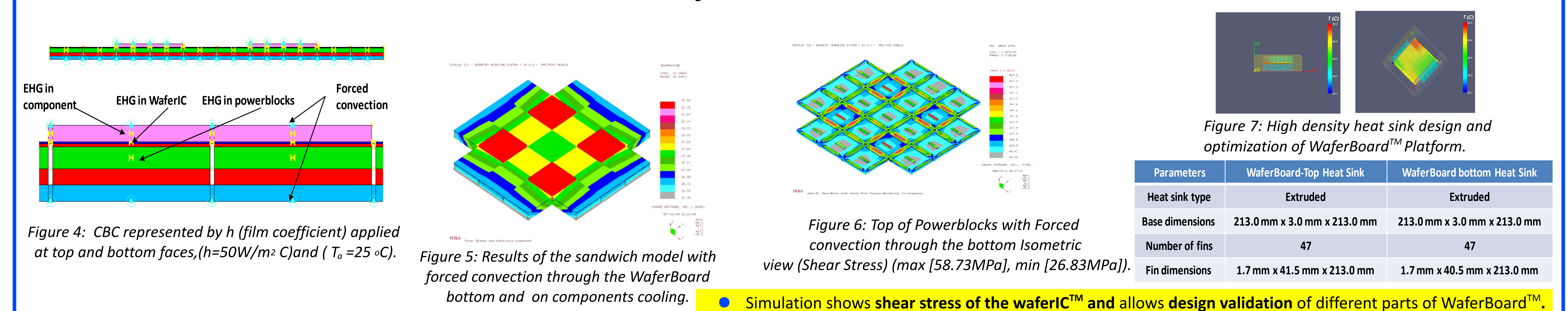


Figure 1: A 3-D model of the WaferBoard™: the black surface is a 200mm wafer, covered by more than a million programmable I/Os. They are capable of sensing the position of user ICs, driving current and propagating digital signals.

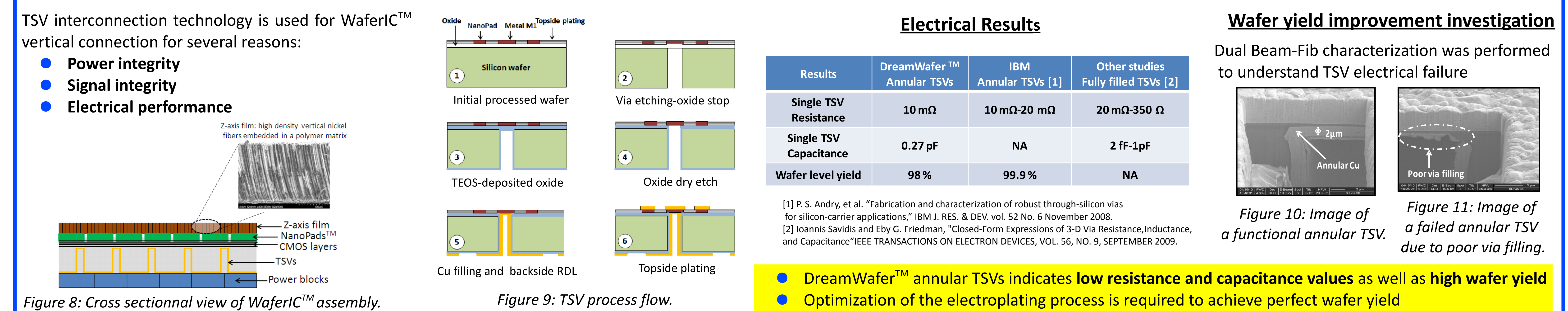
## Multidisciplinary research toward the first WaferBoard™ prototype



## Thermal-mechanical Analysis of different level of WaferBoard™



## Annular Through Silicone Vias (TSVs) Electrical Characterization of the development wafer



## Conclusion

This poster presents the WaferBoard™ concept, an innovative rapid prototyping platform for electronic system. Different research results have been presented here and indicate great promise for the first WaferBoard™ prototype manufacturing:

- Digital signal propagation at 100MHz was demonstrated and overall regulation performance beyond expectations for post-layout simulations was obtained.
- Thermal-mechanical analysis allow evaluation and validation of the design of different levels of the WaferBoard™.
- Good TSVs electrical performance has been found.

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