FUTRFAB

Technology Education With Futrfab

STATE OF THE ART EQUIPMENT FOR EDUCATION AND ACADEMIC RESEARCH

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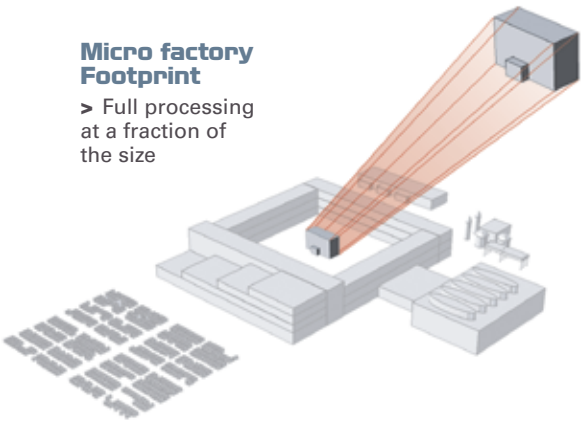
Futrfab has developed a radical technological alternative for the methods and infrastructure to manufacture integrated circuits on both small and large scales of production and—since all production starts with activities that are low scale like research and development—the technology will revolutionize how the industry innovates.

The tools that *Futrfab* develops will have spin-off effects on a number of areas. A significant area with change to come from the Futrfab revolution is the fields of technology related education and academic research. Instead of hand-me down or outdated processing equipment, the equipment such as tools based on the *Futrfab toolPod* will provide the basis for revolution of academic technology activity.

State of the art semiconductor fabricators currently cost to $5-10 billion, and due to their complexity and size, the processing tools in a Fab are also extremely expensive. The most expensive lithography tools, as an extreme example, cost about $100M. These costs make it nearly impossible for academic institutions to operate facilities that have anything close to the type of equipment and processing that occurs at the state of the art fabs.

Micro factory Footprint

> Full processing at a fraction of the size



Futrfab has developed innovations that transform basic aspects of how semiconductor processing will be done. The nature of the changes allow for efficient and significantly smaller elements of fabrication. These facilities occupy a fraction of the typical space of fabricators (as shown in relative scale by the smaller fabricator surrounded by a state of the art fabricator in the figure to the left) at a fraction of the cost as well.

To achieve the mentioned transformation, there are some fundamental innovations that are important to small scale processing activities of all types. The cleanspace fabricator allows for significantly smaller fabricators to begin with. The structure of a cleanspace fabricator (Discussed in more detail in other whitepapers) enables the use of an innovation that *Futrfab* calls the *toolPod.* ToolPods are best utilized when the tooling is designed to process small wafers; and due to economies of scale toolPod's will, therefore, dramatically lower the basic cost for small wafer based tooling.

In an academic environment there will be a number of uses for the new *toolPod* infrastructure. Simplified tools made from *toolPods* can populate small fabricating environments of various kinds. In the figure to the right a *FutrLab* may be formed from a small number of tools. Substrates can be processed to simplified educational directed processing flows or alternatively they may be shared between academic processing FutrLabs and also with more standard *Futrfab* models.

In Research Labs, the *toolPod* infrastructure will allow for research and development tooling to be built into toolPods that contain all the components except for the processors. Either mounted in FutrLabs or on specially designed support and test stands, research labs will be able to explore and research materials, processes, devices and other basic research related studies with an infrastructure that is consistent with state of the art processing.

The Revolution that Futrfab is innovating will transform the world of high technology… a world which will span both industry and academia.