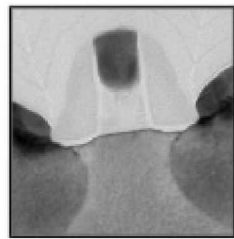
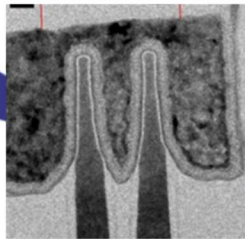


# Far reaching Applications, Implications, and Realization of Digital Electronics at the Atomic Limit (FAIR DEAL)

SAND2020-0539PE



65 nm



10 nm

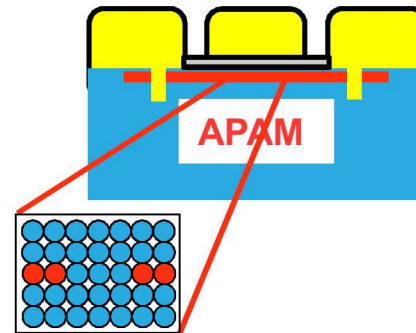


5-7 nm

Mission: Use Atomic Precision Advanced Manufacturing (APAM) to assess opportunities for the future of digital microelectronics from the atomic limit

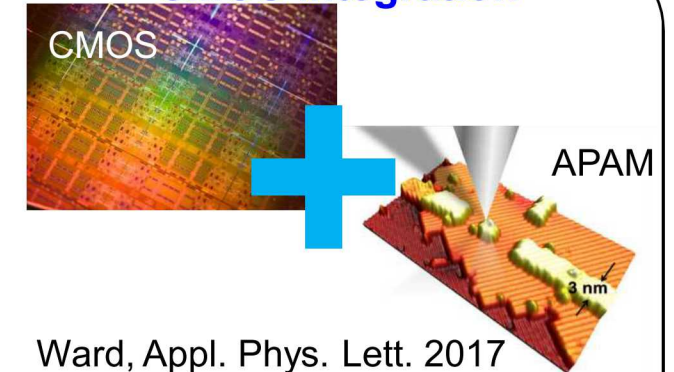
This work was supported in part by the Laboratory Directed Research and Development program at Sandia National Laboratories, a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

## APAM-enabled Devices



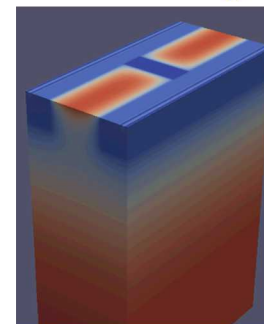
Katzenmeyer, EIPBN 2019  
Anderson, ICSI/ISTDM 2019  
Schmucker, MRS Fall 2019

## CMOS Integration



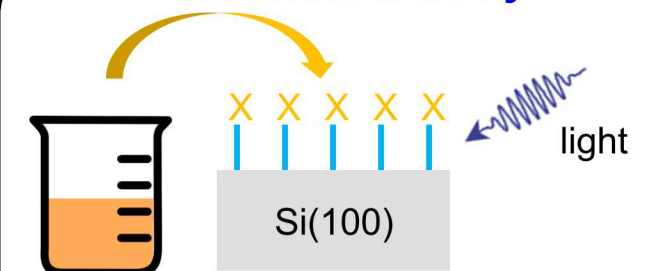
Ward, Appl. Phys. Lett. 2017  
Misra, AVS 2018  
Campbell, MRS Spring 2019

## Modeling



Maurer, IWCN 2019  
Gao, WINDS 2019  
Mamaluy, WINDS 2019

## Manufacturability



Frederick, NM AVS 2019 (PD award)  
Dwyer, APS March Meeting 2019  
Misra, SPIE Adv. Litho. 2020