

TFT vs. ULSIC - from Nano to Giga Electronics
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Abstract:

The annual businesses of IC and LCD products are near US \$300B and \$80B, separately. Currently, the state-of-the-art wafer size of IC is 12-inch while that of the TFT substrate glass is 3m by 3m. Both are highly successful industries. While basic devices in ULSIC and TFT LCD, i.e., MOSFETs and TFTs, are operated under the same principle, the key materials and fabrication processes are similar but different.

The uniqueness of the IC technology lies in the high-density, high-speed transistors integrated with multilevel interconnect lines. The uniqueness of the a-Si:H TFT product is its capability of integrating devices on ultra-large size substrates at a low temperature. Recently, there are new developments in TFTs that broaden applications from the pixel driving to CPUs and high speed circuits. At the same time, the large-area fabrication capability remains. In addition, a new plasma-based copper interconnect technology that is suitable for both ULSICs and TFTs has been developed. This is a good time to examine these two technologies and to explore their possible future developments. The speaker will analyze similarities and differences of these technologies and show examples on how they can learn from each other and collaborate in developing future products.

Bio:

Dr. Yue Kuo is Dow Professor in Texas A&M University. He established the Thin Film Nano & Microelectronics Research Laboratory when joined the university in 1998. Previously, he spent 20 years in industry, i.e., IBM T. J. Watson Research Center and Silicon Valley. He is one of the very few researchers who have extensive experience in both research and mass production of ULSICs and TFT LCDs in USA and Japan. Among many honors he received, he is an IEEE Fellow, ECS Fellow, and ECS Electronics and Photonics Awardee. Many of his research results have been interpreted in industry processes around the world. He authors and edited over 400 papers, 19 transactions/proceedings, journals, and books. His 2-volume TFT book has been a class textbook in the field. He has delivered 130 plenary, keynote, and invited talks in conferences, R&D centers, and universities. He also served in panels and advisory committees for governments, industry, national academies, and universities, globally.