

II BOE-ziSIM: A Design-Technology-Manufacturing Co-optimization Platform

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1. Introduction

- 2. Litho Simulation
- 3. Design-Technology-Manufacturing Co-optimization
- 4. Experiment Results



1. Introduction

IOLED Fabrication Process



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IOLED Photo Process & IC Photo Process



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Why OLED Simulation is Necessary



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2. Litho Simulation

Background of Litho Simulation

- > In 1975, F. H. Dill from IBM gave the first attempt to describe lithography with mathematical equations.
- In 1979, Andy Neureuther from UC Berkeley released the lithography simulation program SAMPLE, which was made available to the lithography community.
- > In 1985, Chris Mack introduced the model PROLITH (Positive Resist Optical LITHography model).
- > In 2006, Synopsys acquired Sigma-C and released Sentaurus Litho (S-Litho).

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S-litho	Prolith	

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Detail of Litho Simulation







Detail of Litho Simulation





Detail of Litho Simulation





Litho Simulation in OLED



Development with Prof. Dong Lisong of IMECAS and Nanjing Chengxin IC research co.,Ltd;

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Photo Process UI



Photo Process



Post-bake Model Optimization



3. Design-Technology-Fabrication Cooptimization

DTCO



No Volume Production Optimization



DTCO: Picture from Synopsys

OLED Fabrication RCA



Yield is the most important thing for fabrication, and RCA is the most useful method to improve.

Work Flow	Monitor	Data	Decide	Demo Analysis	Improve
Work Content	Monitor Defective	Data Integrated	Find Out Reason	Mechanism Confirm	> Improvement
Method	> Manual	≻ Manual + System	> Tool + Experience	> Manual	≻ Manual
System	≻ BO/YMS	> MDW/YMS/DFS	≻ Minitab/JMP	≻ No	≻ Np
Percentage	≻ Daily	≻ 33%	≻ 21%	≻ 30%	≻ 16%
Dis- advantage	Time Delay	InefficiencyNo relative	≻ Experience	Repeat Data Reduction	No Know-how Reuse

||Design-Technology-Manufacturing Co-optimization BOE | 🕜



Design-Technology-Manufacturing Co-optimization Structure







BOE-ziSIM: A Design-Technology-Fabrication Co-optimization Platform

Process-Device-Yield







4. Experiment

||Experiment

Defect	Mura		
Background	 Product: BOEXXX ACT From X.23 to X.27 Defective Measurement Data after X.23 		
Method	> Choose 3% as negative sample		
Data	> 1250 Tracking Parameter		
Time	> 5min		
RCA Results	Chance Difference Rank No.1 is Equipment XXX Stacked Bar Output: Page and the p		
Relative	Relative to Dose Value of Photo Equipment XX		

Process Simulation



Process Parameter Turing

Yield Improvement time reduce from Day to Minutes!



- Design-Technology-Manufacturing Co-optimization is a new way to improve yield, as well as process and device.
- Process simulation is more important for fabrication.
- More partners are welcome to join this work to complete the relative theory, algorithm, software, and ...



Thanks very much!