

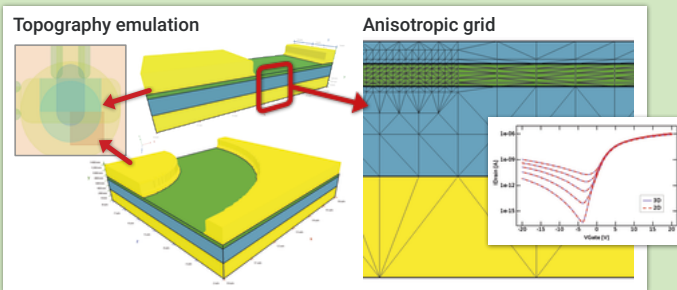
# Displays

a-Si • LTPS • IGZO/Oxide • Organic • Amorphous Materials

- Silicon-based TFTs
- IGZO-based TFTs
- IGZO Reliability Model
- Amorphous Materials Mobility Modeling



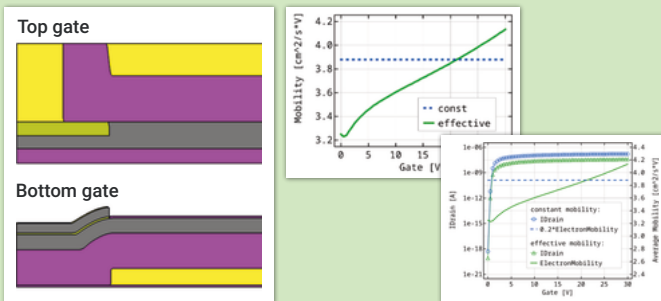
## Example: 3D a-Si TFT - Parameter Variation



- Bottom-gated half-corbino architecture
- Efficient anisotropic mesh setup
- TFT simulated in sections (layout based)
- Top or double-gated variants available
- Validation of 2D simulation accuracy by 3D → accurate and efficient
- DOE: – Density-of-states (DOS)  
– Interface trap parameter variation



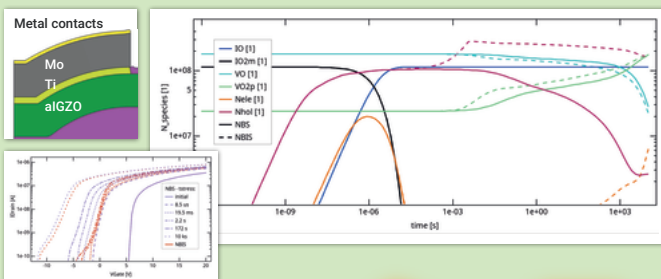
## Examples: IGZO TFT: Effective Mobility Modeling



- Microscopic variability to effective model
- Reproduces experimental gate bias dependency of mobility over large T range
- Detailed microscopic model scalable to hundreds of nanometers
- More efficient approach for  $\mu\text{m}$  range:  
➔ Effective model calibrated to IGZO measurement data



## Example: IGZO TFT Reliability: Illumination Stress Modeling



- Carrier injection: Schottky-Barrier contacts
- Chemical module: Ion reaction and diffusion modeling
- Carrier generation based on:
  - Input light spectrum
  - Material absorption
- ➔ Accelerates chemical reactions and degradation

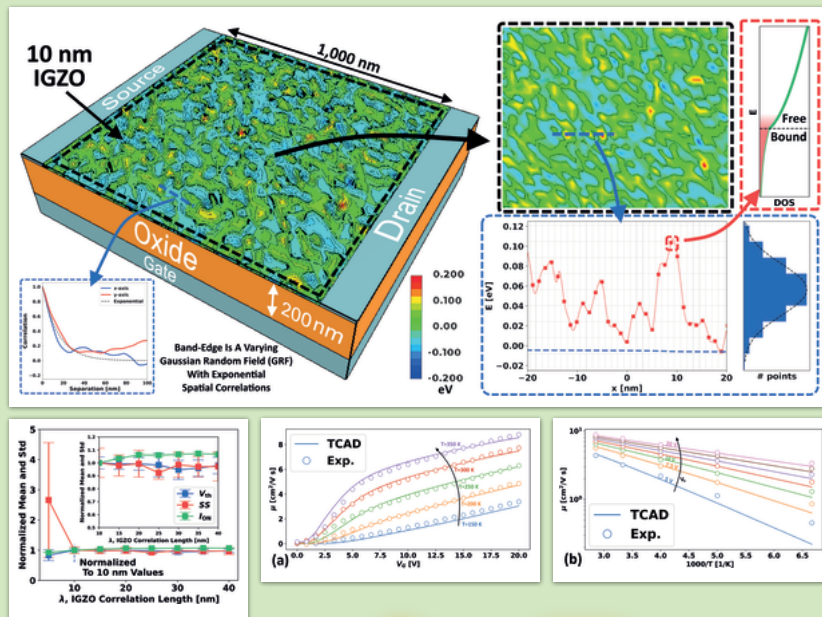


Read more, find tutorials and examples at [globaltcad.com/display](http://globaltcad.com/display)



# • Latest Scientific Models

## Details: Amorphous Materials / Oxide Mobility Modeling



- Stochastic modeling of spatially varying band-edge (landscape)
- Non-conducting band-tail states
- Intrinsically captures material variability
- Detailed reproduction of bias and temperature dependence of IGZO mobility (fig. a, b)
- Can be applied to any disordered (amorphous) material



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**GTS Nano Device Simulator (NDS)** is based on the direct solution of the sub-band Boltzmann transport equation (SBTE), and includes detailed scattering and tunneling models. These predictive physical models allow to explore and exploit device physics at the nano scale, such as crystal orientation, strain, and material composition. Get a well-optimized device design even before going to silicon – reducing both cost and time to market.



**GTS Framework** is a full 2D/3D TCAD suite including outstanding classical and quantum-mechanical device and circuit simulators, tools for reliability and variability analysis as well as a powerful job server for grid computing; all with a consistent, easy-to-use 3-level (graphical/tree/text-file) interface.

