

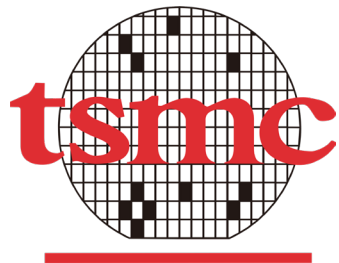
Berkeley Device Modeling Center

Center Overview

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Center Members



SAMSUNG

intel



cādence

SYNOPSYS

Qualcomm



Center Personnel

- Faculty Directors: Sayeef Salahuddin
Chenming Hu
- Executive Director: Ahtisham Ul Haq Pampori
- Postdoctoral Fellows: Shivendra Singh Parihar
Abhishek Kumar
- Ph.D. Students: Jen-Hao Chen
- Subcontractors: IIT Roorkee, Avirup Dasgupta
IIT Kanpur, Yogesh Chauhan

Center Missions and Operation

1. Develop new features and better speed/accuracy for all BSIM CMC standard models.
2. Develop and support compact models for emerging technologies/applications.
3. Center seeks and supports CMC standardization.
4. Members may use Center models/codes for R&D and products.
5. Members may suggest new research topics. Center Directors initiate new topics and allocate resources based on judged importance and Members' feedback.

Nov. 2025 Members Satisfaction Survey Results

CMC Standard Models	Satisfaction Median (1-10)(2024 Median)	Center Action
BSIM-CMG	9 (9)	Continue Effort
BSIM-IMG	10 (8.5)	Continue Effort
BSIM-Bulk	9 (9)	Continue Effort
BSIM-SOI	9 (9)	Continue Effort
BDMC Models	Satisfaction Interest Median (1-10)(2024 Median)	Center Action
STT MRAM model	8 (8) 8.5 (8)	Continue Effort
Neural Network CMG Model	8 (8) 9 (8)	Continue Effort
BSIM AI Extractor	9 (8) 9 (8)	Continue Effort
NN-based RDSMOD for BSIMCMG111.2.1	8 9	Continue Effort
BSIM AI Extractor with improved geometry extraction	8 9	Continue Effort
BSIM Physics Aware NN Model	8 9	Continue Effort
BSIM NN Assist for CMG devices	9 9	Continue Effort
New Projects	Interest Median (1-10)	
2D TMD Model	8.5 (7.5)	Part of TFST Model

TFST: Thin Film Semiconductor Transistor (includes oxide transistors and TMDs)

Standard Models - 2025 Member Comments, Requests & Center Responses

MODEL	COMMENT	REQUESTS	CENTER RESPONSE
CMG	Good model. Very helpful.	Improve LDMOS/HV model. Improve noise model.	Need data.
IMG	Good improvements.	--	--
BULK	Good improvements. Very helpful.	Add binning for HV and Impact Ionization. GMSAT non-smoothness.	Need details/data.
SOI	Good improvements in speed and flexibility. Very helpful.		

BDMC Models - 2025 Member Comments, Requests & Center Responses

MODEL	COMMENT	REQUESTS	CENTER RESPONSE
MRAM	No development in 2025	--	
NN ASSIST	Good improvements.	Evaluating (1) feature reduction for NN inputs (2) methods for handling limited measurement data.	Need details for (1). Happy to have discussions for (2)
RRAM	Good improvements. Very helpful.	Does not operate in DC, and it is difficult to extract parameters.	Need details/data.
TFT	How to engage the industry?		Change name to TFST for clearer understanding

BDMC and CMC Code Releases in 2025

BDMC Releases:

BSIM-NN model:

BSIM-PNNBDMC-BDMC1-04/02/2025

BSIM AI Extractor:

BSIM-Extractor-BDMC2_02/10/2025

BSIM-NN-Assist model:

BSIM-CMG111.2.1-NN-ASSIST-BDMC1_01/17/2025

BSIM-CMG-NN-ASSIST-BDMC1.0.0_09/30/2025

CMC Releases:

BSIM-CMG model:

BSIM-CMG_112.0.0_01/06/2025

BSIM-CMG_112.1.0beta0_1_03/06/2025

BSIM-CMG_112.1.0beta0_2_06/18/2025

BSIM-IMG model:

BSIM-IMG 102.9.7 beta0_1_06/23/2025

BSIM-SOI model:

BSIM-SOI 4.7.0 Beta10_02/12/2025

BSIM-SOI 4.7.0 Beta11_02/21/2025

BSIM-SOI 4.7.0_05/20/2025

BSIM-SOI 100.1.1 Beta1_04/03/2025

BSIM-SOI 100.1.1 Beta2_07/03/2025

BSIM-SOI 100.1.1_09/15/2025

BSIM-BULK model:

BSIM-BULK_107.2.1_02/12/2025

BSIM-BULK 107.2.2 Beta 1_09/16/2025

BSIM4 model:

BSIM4 4.8.3_05/19/2025

Journal/Conference Publications in 2025

- J. -H. Chen, A. Pampori, C. -T. Tung, S. Salahuddin and C. Hu, "**A BSIM Compact Model of Two-Dimensional Semiconductor Field Effect Transistors**," 2025 9th IEEE Electron Devices Technology & Manufacturing Conference (EDTM), Hong Kong, Hong Kong, 2025, pp. 1-3, doi: 10.1109/EDTM61175.2025.11040344.
- C. T. Tung, S. Salahuddin and C. Hu, "**BSIM-NN: A Machine Learning Compact Model for Fast IC Simulation**," 2025 9th IEEE Electron Devices Technology & Manufacturing Conference (EDTM), Hong Kong, Hong Kong, 2025, pp. 1-3, doi: 10.1109/EDTM61175.2025.11040826.
- C. -T. Tung, J. -H. Chen, S. Salahuddin and C. Hu, "**Physics-Enhanced Neural Network Compact Model for Fast and Flexible Transistor Modeling**," in IEEE Transactions on Electron Devices, vol. 72, no. 12, pp. 6487-6493, Dec. 2025, doi: 10.1109/TED.2025.3627591.
- J.-H. Chen, F. Chavez, C.-T. Tung, S. Khandelwal, and C. Hu, "**A multi-stage neural network I–V and C-V BSIM-CMG model global parameter extractor for advanced GAAFET technologies**," Solid-State Electron., vol. 226, Jun. 2025, Art. no. 109081, doi: 10.1016/j.sse.2025. 109081.

Guided by our view of device technology trends

1. Next 3D FET is **CFET** having stacked n and p FETs.
2. **3D ICs** need semiconductor thin films on SiO₂, e.g., **2D semiconductors** (MoS₂, WSe₂...) or **oxides** (IGZO, IWO, SnO...). **They are all TFST.**
3. Dense ICs need **low power (V_{dd})**: **NCFET** can reduce V_{dd} to 0.6V, 0.5V...
Already, **1nm NC film on 0.8nm interfacial oxide** **reduces EOT to 0.5nm.**
4. **New memories**, potential neuromorphic computing:
 - **FE memory** (FeRAM, FTJ, FeFET)
 - **RRAM**
5. **AI** will change compact models, IC simulation and design.

Two Technical Presentations

- NN-assist BSIM Prof. Avirup Dasgupta
- Physical NN Compact Model for Flexible Modeling Jen-Hao Chen

The background is a solid blue color. Overlaid on this is a network of thin white lines connecting several small white circular nodes. The nodes are positioned at various points, creating a series of interconnected triangles and polygons. The overall effect is a subtle, modern geometric pattern.

Thank You