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URL: <http://www.eecs.berkeley.edu/Faculty/Homepages/salahuddin.html>

EDUCATION

PhD, Dec, 2007	Electrical and Computer Engineering	Purdue University, West Lafayette, IN.
B. Sc. May, 2003	Electrical and Electronic Engineering	Bangladesh University of Engineering and Technology, Dhaka.

PROFESSIONAL EXPERIENCE

2019- present	TSMC Distinguished Professor	EECS, UC Berkeley
2017-2019	Professor	EECS, UC Berkeley
2014-2017	Associate Professor	EECS, UC Berkeley
2008-2014	Assistant Professor	EECS, UC Berkeley
2008	Post-doctoral research associate	Purdue University, West Lafayette, IN.
2007	Research intern	IBM Almaden Research Center, San Jose, CA.

TECHNOLOGY TRANSFER

- Co-founded Sonera Magnetics which is developing next generation brain-machine interface technology(<https://www.linkedin.com/company/sonera-magnetics/>)
- Patent licensed for use as the core technology by Sunrise 3D which is developing 3D memory solutions (<https://www.linkedin.com/company/sunrisememory/>)

TECHNICAL CONSULTING

- Consulted for Multiple Tier 1 memory companies and electronic material companies in the broad areas of transistors, memory cells, fabrication and material synthesis.

LITIGATION CONSULTING

- Expert witness on lithography technology related to FINFET technology (Retained by Latham & Watkins)
- Expert witness on technology related to FINFET fabrication processes (Retained by Wilmer Hale)
- Expert witness on technology related to heteroepitaxy and conformal synthesis of materials in the context of advanced transistor fabrication (Retained by Wilmer Hale)
- Expert witness on technology related to simulation of structures and current flow related to advanced transistors (Retained by Wilmer Hale)

LEADERSHIP and SERVICE HIGHLIGHTS

- Member of the Technical Advisory Board, Natcast, the operator for the National Semiconductor Technology Center
- Was member of the organizing team of multiple NSF panels on Microelectronics in the context of the CHIPS act. Specifically, coined the term CMOS+X and was the main organizer of a NSF workshop with the same name. CMOS+X has become one of the main research themes for NSF in this area as reflected in the request for proposals of multiple NSF initiatives.
- Co-authored the DOE Basic Research Needs for Microelectronic Document which led to EFRC initiatives in 2019 and DOE Lab initiatives in 2020.
- Director, E2CDA/ENIGMA center. A center on Energy Efficient Learning Machines, jointly supported by National Science Foundation (NSF) and Semiconductor Research Corporation (SRC).
- Co-Director, ASCENT, one of the six centers within the JUMP initiative, an effort jointly funded by DARPA and Semiconductor Research Corporation.
- Founder Co-Director of the Berkeley Center for Negative Capacitance Transistors, a center supported by Industry Affiliate Members. Co-directed with Chenming Hu.
- Founder Co-Director of the Berkeley Device Modeling Center. Co-Directed with Chenming Hu.
- Member, IEEE Electron Devices Society Publications Committee
- Panel member, Symposium on VLSI Technology (2021), IEDM evening panel, 2016, DRC evening panel (2018).
- Chair, the EDS committee on Nanotechnology (2014-2017).
- Served in the technical committee of leading conferences on electronic and spintronic devices such as IEDM, DRC, Symposium of VLSI Technology, Intermag.
- Served as one of the editors of IEEE Electron Devices Letters (2013-2017)

SELECTED AWARDS AND HONORS

- 2025 IEEE Andrew Grove Award
- 2024 Fellow, American Association for the Advancement of Science (AAAS)
- 2020 Fellow, American Physical Society (APS)
- 2019 IEEE George E Smith Award
- 2019 Fellow, Institute of Electrical and Electronics Engineers (IEEE)
- 2016 Presidential Early Career Award for Scientist and Engineers (PECASE)
- 2013 Army Research Office (ARO) YIP (Young Investigator Program) Award
- 2013 Air Force Office of Scientific Research (AFOSR) Young Investigator Award
- 2013 Participant in the National Academy German American Frontiers of Engineering Symposium
- 2012 IEEE Nanotechnology Council Early Career Award
- 2012 NSF CAREER Award
- 2010 Hellman Family Faculty Fellow
- 2009 UC Regents Junior Faculty Fellowship
- 2007 MARCO/FCRP Inventor Recognition Award

- 2007 IBM PhD Fellowship
- 2003 Kintarul Haque Gold Medal, Bangladesh University of Engineering and Technology (BUET)
(top of the graduating class)

SELECTED STUDENTS' AWARDS

- 2020 Best paper Award, Device Research Conference (Ava Tan)
- 2019 First prize and Gold medal, ACM Student Research Competition (Elizabetha Tresmina)
- 2019 Best paper award, IEEE VLSI-TSA conference (Ava J Tan)
- 2017 Intelligence Community postdoctoral fellowship, Dominic Labanowski
- 2013 Best paper award, IEEE VLSI-TSA conference (with A. I. Khan, C. Yeung, A Sarker and C. Hu).
- 2013 Best paper award, IEEE Transactions on VLSI systems (with J. Li, P. Ndai, A. Goel and K. Roy).
- 2012 Qualcomm Innovation Fellowship (A. I. Khan & C. Yeung).
- 2012 Ross Tucker Award for outstanding thesis, 2012, John T. Heron (co-advised with R. Ramesh).
- 2011 Silver award (device category), 5th TSMC outstanding student research award (A. I. Khan).

SELECTED PRESS

- Multiple Department of Energy Basic Energy Sciences Highlights
- Many news articles about research in Nature, Nature Nano, Nature Materials, Physics View Point and other science news outlets e.g. Physics.org and popular technology blogs such as CNET.
- [2 papers were selected in the list of most notable 50 papers among all areas](#) published in Applied Physics Letters between 2009-2012.
- Multiple papers selected for NSF Highlights.
- 5 Journal papers selected for cover story
- First experimental demonstration of negative capacitance stayed as top 20 downloaded papers from APL for two consecutive months.
- Negative Capacitance FET has been listed in the ITRS since 2009.
- Two highlights in the Berkeley Science Review

Education and Outreach and Societal Impact:

Till now, 24 Graduate students and 21 postdoctoral research associates have graduated from Salahuddin's group in the material physics and electronic applications area.

In addition, Salahuddin has mentored 163 undergraduate researchers in these areas over the last 14 years. A large number of these student advisees are women or represent other underrepresented groups. Salahuddin routinely works with minority serving institutions in California as well as HBCUs for recruiting students in his group.

Innovations from Salahuddin's group are currently being used in two different startup companies for commercialization.

Simulation codes developed at Salahuddin's group have been adopted by major semiconductor companies

Salahuddin also co-directs BSIM model development at Berkeley together with Chenming Hu. The BSIM models, *which are open source*, are used as standard models for circuit and system level simulation in the semiconductor industry, making a yearly economic impact of billions of dollars. Additionally, open source BSIM codes are used by thousands of researchers all over the world.

Major Research Accomplishments

- Salahuddin is mostly known for the discovery of the Negative Capacitance effect in ferroelectric materials and the invention of the Negative Capacitance transistors in 2008. Over the last decade Salahuddin performed a series of fundamental work at Berkeley, which established Negative Capacitance *as a new field of research* both in material physics and electronic devices. Indeed, a number of publications has been reported in top tier science journals such as Nature and Nature family journals on negative capacitance from all over the world (in addition to Salahuddin's own publications in these venues). The premier conferences in Physics and Material Science such as the American Physical Society March meeting and Material Research Society Meetings in the Fall and Spring have seen many papers on negative capacitance in the recent years. Tremendous activities have ensued in the electronic devices community. The two most premier conferences in this area are International Electron Devices Meeting (IEDM) and Symposium on VLSI Technology (VLSI). There were two dedicated sessions on negative capacitance transistors in each of IEDM 2017 and VLSI 2018. In IEDM 2018, there were two dedicated sessions and then more papers in the other sessions. The S3S conference in 2018 ran a 3-day long special session only on negative capacitance transistors. This is in addition to 10's of papers that are being published in various journals every year. Major semiconductor industries have also initiated work and published on negative capacitance transistors (such as Intel, Samsung, GlobalFoundries, Applied Materials), including a fully integrated demonstration on the 14nm FINFET platform from GlobalFoundries. Going beyond electronic devices, negative capacitance is also being investigated for super capacitor and solid-state battery applications. Starting from a concept, Negative Capacitance has now become an area of intense research in both scientific and electronic device communities.
- Over the last few years Salahuddin's work has accomplished the thinnest ferroelectrics directly on silicon, showing that
 - Robust ferroelectricity is achievable below 2 nm in doped HfO₂ films directly integrated on silicon and the ferroelectricity gets enhanced with decreasing thickness, balking the trend observed in conventional perovskite ferroelectric and considered fundamental (*Nature 2020*)
 - Negative capacitance can be stabilized in a mixed phase ferroelectric below 2 nm – these films, when used as a gate of a Si transistor demonstrated record performance (*Nature 2022*)
 - Simple binary oxide like ZrO₂ goes through a phase transition when thinned down and shows robust ferroelectricity down to single unit cell thickness or their Two dimensional limit (*Science 2022*).
- In 2014, Salahuddin's group demonstrated the first example of a nanomagnetic logic without the requirement for a magnetic field. A three to four orders of magnitude reduction of energy dissipation was demonstrated compared to state of the art. In 2015, Salahuddin's group also demonstrated switching of perpendicular magnets using an in-plane current, without the need of a magnetic field, by engineering a symmetry breaking in the system. In addition, Salahuddin is the inventor or co-inventor of a number of spin based computing concepts, known as 'all spin logic' (ASL), 'charge

coupled spin logic' (CSL), 'probabilistic spin logic' (PSL), etc. These computing concepts are currently investigated by researchers all over the world in both academia and industry.

- In a surprising prediction in 2012, Salahuddin showed that it should be possible, exploiting the physics of magnetostriction, to obtain ferromagnetic resonance (FMR) just with a voltage and without the need of any external magnetic field. In a series of experiments through 2016-17, Salahuddin's group has experimentally demonstrated such magnetic resonance with purely voltage driven excitation. This phenomenon shows potential for extremely high-resolution sensing of magnetic fields that can enable diverse applications such as brain imaging, functional MRI, cancer remedy etc. Building on the underlying physics of this phenomenon, Salahuddin's group has recently demonstrated a direct excitation of a two-level quantum system, at room temperature, completely electrically. This work could have substantial impact on the emerging field of quantum computing.
- Salahuddin is widely known as one of the firsts to study the potential of two-dimensional semiconductors. Today, the two-dimensional semiconductors are the topic of intense research all over the world. In a pioneering work in 2011 titled, 'How Good Can Monolayer MoS₂ Transistors be?' Salahuddin laid out the early ground work for the potential of these materials for advanced electronics. In addition, simulation work done at Salahuddin's group has led to new ideas such as 'Barrier-free tunneling' in nanotube junctions, negative differential resistance in carbon heterojunctions, resonant tunneling in the source of a MOSFET to provide steep turn ON of the transistor etc. The concept of 'barrier free' tunneling in carbon based tunnel transistors was [selected as one of the 50 most notable papers](#) among all areas between 2009-2012 published by APL).

***PUBLICATIONS IN PEER REVIEWED JOURNALS AND CONFERENCE
PROCEEDINGS***

Published: Journals in [J#] and Conferences in [C#]

2022

- J178.** [“Logically synthesized and hardware-accelerated restricted Boltzmann machines for combinatorial optimization and integer factorization”](#)
Saavan Patel and Philip Canozza and Sayeeef Salahuddin
Nature Electronics, 5, 92-101, 2022.
- J177.** [“One nanometer HfO₂-based ferroelectric tunnel junctions on silicon”](#)
Suraj S Cheema and Nirmaan Shanker and Cheng-Hsiang Hsu and Adhiraj Datar and Jongho Bae and Daewoong Kwon and Sayeeef Salahuddin
Advanced Electronic Materials, 8, 2100499, 2022.
- J176.** [“RKKY Exchange Bias Mediated Ultrafast All-Optical Switching of a Ferromagnet”](#)
Jyotirmoy Chatterjee and Debanjan Polley and Akshay Pattabi and Hyejin Jang and Sayeeef Salahuddin and Jeffrey Bokor
Advanced Functional Materials, 32, 2107490, 2022.
- J175.** [“Fast Read-After-Write and Depolarization Fields in High Endurance n-Type Ferroelectric FETs”](#)
Michael Hoffmann and Ava Jiang Tan and Nirmaan Shanker and Yu-Hung Liao and Li-Chen Wang and Jong-Ho Bae and Chenming Hu and Sayeeef Salahuddin
IEEE Electron Device Letters, 43, 717-720, 2022.
- J174.** [“Ultrathin ferroic HfO₂/ZrO₂ superlattice gate stack for advanced transistors”](#)
Suraj S Cheema and Nirmaan Shanker and Li-Chen Wang and Cheng-Hsiang Hsu and Shang-Lin Hsu and Yu-Hung Liao and Matthew San Jose and Jorge Gomez and Wriddhi Chakraborty and Wenshen Li and others
Nature, 604, 65-71, 2022.
- J173.** [“Innovating at Speed and at Scale: A Next Generation Infrastructure for Accelerating Semiconductor Technologies”](#)
Richard A Gottscho and Edlyn V Levine and Tsu-Jae King Liu and Paul C McIntyre and Subhasish Mitra and Boris Murmann and Jan M Rabaey and Sayeeef Salahuddin and Willy C Shih and H-S Philip Wong
arXiv preprint arXiv:2204.02216, 2022.
- J172.** [“Accelerated Ultrafast Magnetization Dynamics at Graphene/CoGd Interfaces”](#)
Sucheta Mondal and Yuxuan Lin and Debanjan Polley and Cong Su and Alex Zettl and Sayeeef

Salahuddin and Jeffrey Bokor
ACS nano, 16, 9620-9630, 2022.

- J171.** [“A Compact Model of Nanoscale Ferroelectric Capacitor”](#)
Chien-Ting Tung and Girish Pahwa and Sayeeef Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 69, 4761-4764, 2022.
- C70.** [“On the PBTI Reliability of Low EOT Negative Capacitance 1.8 nm HfO₂-ZrO₂ Superlattice Gate Stack on L_g= 90 nm nFETs”](#)
Nirmaan Shanker and Li-Chen Wang and Suraj Cheema and Wenshen Li and Nilotpal Choudhury and Chenming Hu and Souvik Mahapatra and Sayeeef Salahuddin
2022 IEEE Symposium on VLSI Technology and Circuits (VLSI Technology and Circuits), 421-422, 2022.
- J170.** [“Critical Importance of Nonuniform Polarization and Fringe Field Effects for Scaled Ferroelectric FinFET Memory”](#)
Girish Pahwa and Sayeeef Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 2022.
- 2021**
- J169.** [“Unifying femtosecond and picosecond single-pulse magnetic switching in Gd-Fe-Co”](#)
Florian Jakobs and T A Ostler and C-H Lambert and Yang Yang and Sayeeef Salahuddin and Richard B Wilson and Jon Gorchon and Jeffrey Bokor and Unai Atxitia
Physical Review B, 103, 104422, 2021.
- J168.** [“Local negative permittivity and topological phase transition in polar skyrmions”](#)
Sujit Das and Zijian Hong and V A Stoica and M A P Gonçalves and Yu-Tsun Shao and Eric Parsonnet and Eric J Marksz and Sahar Saremi and M R McCarter and A Reynoso and others
Nature materials, 20, 194-201, 2021.
- J167.** [“Novel Spin-Orbit Torque Generation at Room Temperature in an All-Oxide Epitaxial La_{0.7}Sr_{0.3}MnO₃/SrIrO₃ System”](#)
Xiaoxi Huang and Shehrin Sayed and Joseph Mittelstaedt and Sandhya Susarla and Saba Karimeddiny and Lucas Caretta and Hongrui Zhang and Vladimir A Stoica and Tanay Gosavi and Farzad Mahfouzi and others
Advanced Materials, 33, 2008269, 2021.
- J166.** [“Electric field-induced permittivity enhancement in negative-capacitance fet”](#)
Yu-Hung Liao and Daewoong Kwon and Suraj Cheema and Nirmaan Shanker and Ava J Tan and Ming-Yen Kao and Li-Chen Wang and Chenming Hu and Sayeeef Salahuddin
IEEE Transactions on Electron Devices, 68, 1346-1351, 2021.
- J165.** [“Epitaxial ferroelectric Hf_{0.5}Zr_{0.5}O₂ with metallic pyrochlore oxide electrodes”](#)
Zimeng Zhang and Shang-Lin Hsu and Vladimir A Stoica and Hanjong Paik and Eric Parsonnet and Alexander Qualls and Jianjun Wang and Liang Xie and Mukesh Kumari and Sujit Das and others
Advanced materials, 33, 2006089, 2021.
- J164.** [“Energy Storage and Reuse in Negative Capacitance”](#)
Ming-Yen Kao and Yu-Hung Liao and Girish Pahwa and Avirup Dasgupta and Sayeeef Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 68, 1861-1865, 2021.

- J163.** [“Ferroelectric HfO₂ memory transistors with high-Å³ interfacial layer and write endurance exceeding 10¹⁰ cycles”](#)
Ava Jiang Tan and Yu-Hung Liao and Li-Chen Wang and Nirmaan Shanker and Jong-Ho Bae and Chenming Hu and Sayeef Salahuddin
IEEE Electron Device Letters, 42, 994-997, 2021.
- J162.** [“Negative capacitance enables GAA scaling VDD to 0.5 V”](#)
Ming-Yen Kao and Sayeef Salahuddin and Chenming Hu
Solid-State Electronics, 181, 108010, 2021.
- C69.** [“Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices”](#)
Sayeef Salahuddin
2021 IEEE International Reliability Physics Symposium (IRPS), 1-4, 2021.
- J161.** [“Unified framework for charge-spin interconversion in spin-orbit materials”](#)
Shehrin Sayed and Seokmin Hong and Xiaoxi Huang and Lucas Caretta and Arnoud S Everhardt and Ramamoorthy Ramesh and Sayeef Salahuddin and Supriyo Datta
Physical Review Applied, 15, 54004, 2021.
- J160.** [“Compact modeling of temperature effects in FDSOI and FinFET devices down to cryogenic temperatures”](#)
Girish Pahwa and Pragma Kushwaha and Avirup Dasgupta and Sayeef Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 68, 4223-4230, 2021.
- J159.** [“Atomic scale understanding of the electronic structure of 5d-3d perovskite oxide heterostructures using STEM-EELS.”](#)
Sandhya Susarla and Xiaoxi Huang and Shehrin Sayed and Lucas Caretta and Hongrui Zhang and Sayeef Salahuddin and Peter Ercius and Ramamoorthy Ramesh
Microscopy and Microanalysis, 27, 356-358, 2021.
- J158.** [“A compact model of polycrystalline ferroelectric capacitor”](#)
Chien-Ting Tung and Girish Pahwa and Sayeef Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 68, 5311-5314, 2021.
- J157.** [“A voltage-controlled gain cell magnetic memory”](#)
Shehrin Sayed and Cheng-Hsiang Hsu and Sayeef Salahuddin
IEEE Electron Device Letters, 42, 1452-1455, 2021.
- J156.** [“Double-peaked resonance in harmonic-free acoustically driven ferromagnetic resonance”](#)
Adi Jung and Dorotea Macri and Samuel Margueron and Ausrine Bartasyte and Sayeef Salahuddin
Applied Physics Letters, 119, 142403, 2021.
- J155.** [“Large Injection Velocities in Highly Scaled, Fully Depleted Silicon on Insulator Transistors”](#)
Yu-Hung Liao and Khandker Akif Aabrar and Wriddhi Chakraborty and Wenshen Li and Suman Datta and Sayeef Salahuddin
IEEE Electron Device Letters, 43, 184-187, 2021.
- C68.** [“Towards the Integration of Hf 0.8 Zr 0.2 O₂-based Negative Capacitance Dielectrics on \$\beta\$ -Ga₂O₃ Substrates”](#)
Guillermo A Salcedo and Ahmad E Islam and Michael K Dietz and Suraj Cheema and Kevin D Leedy and Kyle J Liddy and Andrew J Green and Weisong Wang and Sayeef Salahuddin and Kelson D Chabak and others

NAECON 2021-IEEE National Aerospace and Electronics Conference, 7-11, 2021.

- C67.** [“Demonstration of Low EOT Gate Stack and Record Transconductance on \$L_g = 90\$ nm nFETs Using 1.8 nm Ferroic HfO₂-ZrO₂ Superlattice”](#)
W Li and L C Wang and S S Cheema and N Shanker and J H Park and Y H Liao and S L Hsu and C H Hsu and S Volkman and U Sikder and others
2021 IEEE International Electron Devices Meeting (IEDM), 13-16, 2021.
- C66.** [“FeFETs for Near-Memory and In-Memory Compute”](#)
Sayeeff Salahuddin and Ava Tan and Suraj Cheema and Nirmaan Shanker and Michael Hoffmann and J-H Bae
2021 IEEE International Electron Devices Meeting (IEDM), 14-19, 2021.
- 2020**
- J154.** [“Ferroelectric Domain Wall Motion in Freestanding Single-Crystal Complex Oxide Thin Film”](#)
Saidur R Bakaul and Jaegy Kim and Seungbum Hong and Mathew J Cherukara and Tao Zhou and Liliana Stan and Claudy R Serrao and Sayeeff Salahuddin and Amanda K Petford-Long and Dillon D Fong and others
Advanced Materials, 32, 1907036, 2020.
- C65.** “Electric-field control of the interlayer exchange coupling”
Shehrin Sayed and Cheng-Hsiang Hsu and Niklas Roschewsky and See-Hun Yang and Sayeeff Salahuddin
American Physical Society (March Meeting), 2020.
- J153.** [“Spin-orbit torque generated by amorphous Fe_{1-x}Si_x”](#)
Cheng-Hsiang Hsu and Julie Karel and Niklas Roschewsky and Suraj Cheema and Dinah Simone Bouma and Shehrin Sayed and Frances Hellman and Sayeeff Salahuddin
arXiv preprint arXiv:2006.07786, 2020.
- J152.** [“Tunable magnetoelastic effects in voltage-controlled exchange-coupled composite multiferroic microstructures”](#)
Zhuyun Xiao and Roberto Lo Conte and Maite Goirienea-Goikoetxea and Rajesh V Chopdekar and C-HA Lambert and Xiang Li and A T Ndiaye and P Shafer and S Tiwari and A Barra and others
ACS applied materials & interfaces, 12, 6752-6760, 2020.
- J151.** [“Fully transparent field-effect transistor with high drain current and on-off ratio”](#)
Jisung Park and Hanjong Paik and Kazuki Nomoto and Kiyoun Lee and Bo-Eun Park and Benjamin Grisafe and Li-Chen Wang and Sayeeff Salahuddin and Suman Datta and Yongsung Kim and others
APL Materials, 8, 11110, 2020.
- J150.** [“Tunneling electroresistance effects in epitaxial complex oxides on silicon”](#)
Mohammad Abuwasib and Claudy R Serrao and Liliana Stan and Sayeeff Salahuddin and Saidur Rahman Bakaul
Applied Physics Letters, 116, 32902, 2020.
- J149.** [“BSIM compact model of quantum confinement in advanced nanosheet FETs”](#)
Avirup Dasgupta and Shivendra Singh Parihar and Pragya Kushwaha and Harshit Agarwal and Ming-Yen Kao and Sayeeff Salahuddin and Yogesh Singh Chauhan and Chenming Hu
IEEE Transactions on Electron Devices, 67, 730-737, 2020.

- J148.** [“A density metric for semiconductor technology \[point of view\]”](#)
H-S Philip Wong and Kerem Akarvardar and Dimitri Antoniadis and Jeffrey Bokor and Chenming Hu and Tsu-Jae King-Liu and Subhasish Mitra and James D Plummer and Sayeeff Salahuddin
Proceedings of the IEEE, 108, 478-482, 2020.
- J147.** [“Enhanced ferroelectricity in ultrathin films grown directly on silicon”](#)
Suraj S Cheema and Daewoong Kwon and Nirmaan Shanker and Roberto Dos Reis and Shang-Lin Hsu and Jun Xiao and Haigang Zhang and Ryan Wagner and Adhiraj Datar and Margaret R McCarter and others
Nature, 580, 478-482, 2020.
- C64.** [“BSIM-IMG: Advanced Model for FDSOI Transistors with Back Channel Inversion”](#)
H Agarwal and P Kushwaha and Avirup Dasgupta and M Y-Kao and T Morshed and G Workman and K Shanbhag and X Li and V Vinothkumar and Y S Chauhan and others
2020 4th IEEE Electron Devices Technology & Manufacturing Conference (EDTM), 1-4, 2020.
- C63.** [“Reliability of ferroelectric HfO₂-based memories: From MOS capacitor to FeFET”](#)
Ava J Tan and Li-Chen Wang and Yu-Hung Liao and Jong-Ho Bae and Chenming Hu and Sayeeff Salahuddin
2020 Device Research Conference (DRC), 1-2, 2020.
- C62.** “GC-eDRAM design using hybrid FinFET/NC-FinFET”
Ramin Rajaei and Yen-Kai Lin and Sayeeff Salahuddin and Michael Niemier and X Sharon Hu
Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design, 199-204, 2020.
- J146.** “Ising model optimization problems on a FPGA accelerated restricted Boltzmann machine”
Saavan Patel and Lili Chen and Philip Canozza and Sayeeff Salahuddin
arXiv preprint arXiv:2008.04436, 2020.
- J145.** “Analysis and modeling of polarization gradient effect on negative capacitance FET”
Ming-Yen Kao and Girish Pahwa and Avirup Dasgupta and Sayeeff Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 67, 4521-4525, 2020.
- J144.** [“Resonant enhancement of exchange coupling for voltage-controlled magnetic switching”](#)
Shehrin Sayed and Cheng-Hsiang Hsu and Niklas Roschewsky and See-Hun Yang and Sayeeff Salahuddin
Physical Review Applied, 14, 34070, 2020.
- J143.** [“Design optimization techniques in nanosheet transistor for RF applications”](#)
Pragya Kushwaha and Avirup Dasgupta and Ming-Yen Kao and Harshit Agarwal and Sayeeff Salahuddin and Chenming Hu
IEEE Transactions on Electron Devices, 67, 4515-4520, 2020.
- C61.** [“Dynamic memory and sequential logic design using negative capacitance finfets”](#)
Ramin Rajaei and Yen-Kai Lin and Sayeeff Salahuddin and Michael Niemier and Xiaobo Sharon Hu
2020 IEEE International Symposium on Circuits and Systems (ISCAS), 1-5, 2020.
- J142.** [“Electric-field control of spin dynamics during magnetic phase transitions”](#)
Tianxiang Nan and Yeonbae Lee and Shihao Zhuang and Zhongqiang Hu and James D Clarkson and Xinjun Wang and Changhyun Ko and HwanSung Choe and Zuhuang Chen and David Budil and others
Science advances, 6, eabd2613, 2020.

- J141.** [“Highly scaled, high endurance, \$\Lambda\$ -gate, nanowire ferroelectric FET memory transistors”](#)
Jong-Ho Bae and Daewoong Kwon and Namho Jeon and Suraj Cheema and Ava Jiang Tan and Chenming Hu and Sayeef Salahuddin
IEEE Electron Device Letters, 41, 1637-1640, 2020.
- C60.** [“Hot electrons as the dominant source of degradation for sub-5nm HZO FeFETs”](#)
Ava J Tan and Milan Peâ%o^Â°iÆ’Ä; and Luca Larcher and Yu-Hung Liao and Li-Chen Wang and Jong-Ho Bae and Chenming Hu and Sayeef Salahuddin
2020 IEEE Symposium on VLSI Technology, 1-2, 2020.
- 2019**
- J140.** [“Spatially resolved steady-state negative capacitance”](#)
Yadav, Ajay K. and Nguyen, Kayla X. and Hong, Zijian and Garcia-Fernandez, Pablo and Aguado-Puente, Pablo and Nelson, Christopher T. and Das, Sujit and Prasad, Bhagawati and Kwon, Daewoong and Cheema, Suraj and Khan, Asif I. and Hu, Chenming and Vignuez, Jorge and Junquera, Javier and Chen, Long-Qing and Muller, David A. and Ramesh, Ramamoorthy and **Salahuddin, Sayeef**
Nature, 565, 7740, 468–471, 2019.
- J139.** [“Spacer Engineering in Negative Capacitance FinFETs”](#)
Lin, Yen-Kai and Agarwal, Harshit and Kao, Ming-Yen and Zhou, Jiuren and Liao, Yu-Hung and Dasgupta, Avirup and Kushwaha, Pragma and **Salahuddin, Sayeef** and Hu, Chenming
IEEE Electron Device Letters, 40, 6, 1009–1012, 2019.
- J138.** [“Challenges to Partial Switching of Hf_{0.8}Zr_{0.2}O₂ Gated Ferroelectric FET for Multilevel/Analog or Low Voltage Memory Operation”](#)
Chatterjee, Korok and Kim, Sangwan and Karbasian, Golnaz and Kwon, Daewoong and Tan, Ava J and Yadav, Ajay K and Serrao, Claudy R and Hu, Chenming and **Salahuddin, Sayeef**
IEEE Electron Device Letters, 2019.
- J137.** [“Optimization of NCFET by Matching Dielectric and Ferroelectric Nonuniformly Along the Channel”](#)
Kao, Ming-Yen and Lin, Yen-Kai and Agarwal, Harshit and Liao, Yu-Hung and Kushwaha, Pragma and Dasgupta, Avirup and **Salahuddin, Sayeef** and Hu, Chenming
IEEE Electron Device Letters, 40, 5, 822–825, 2019.
- J136.** [“A Spin-Orbit-Torque Memristive Device”](#)
Zhang, Shuai and Luo, Shijiang and Xu, Nuo and Zou, Qiming and Song, Min and Yun, Jijun and Luo, Qiang and Guo, Zhe and Li, Ruofan and Tian, Weicheng and Li, Xin and Zhou, Hengan and Chen, Huiming and Zhang, Yue and Yang, Xiaofei and Jiang, Wanjun and Shen, Ka and Hong, Jeongmin and Yuan, Zhe and Xi, Li and Xia, Ke and **Salahuddin, Sayeef** and Diény, Bernard and You, Long
Advanced Electronic Materials, 1800782, 2019.
- J135.** [“Characterization and Modeling of Flicker Noise in FinFETs at Advanced Technology Node”](#)
Kushwaha, Pragma and Agarwal, Harshit and Lin, Yen-Kai and Dasgupta, Avirup and Kao, Ming-Yen and Lu, Ye and Yue, Yun and Chen, Xiaonan and Wang, Joseph and Sy, Wing and Yang, Frank and Chidambaram, PR. Chidi and **Salahuddin, Sayeef** and Hu, Chenming
IEEE Electron Device Letters, 40, 6, 985–988, 2019.
- J134.** [“Analysis and Modeling of Inner Fringing Field Effect on Negative Capacitance FinFETs”](#)

- Lin, Yen-Kai and Agarwal, Harshit and Kushwaha, Pragya and Kao, Ming-Yen and Liao, Yu-Hung and Chatterjee, Korok and **Salahuddin, Sayeef** and Hu, Chenming
IEEE Transactions on Electron Devices, 66, 4, 2023–2027, 2019.
- J133.** [“Spin-orbit torque and Nernst effect in Bi-Sb/Co heterostructures”](#)
Roschewsky, Niklas and Walker, Emily S and Gowtham, Praveen and Muschinske, Sarah and Hellman, Frances and Bank, Seth R and **Salahuddin, Sayeef**
Physical Review B, 99, 19, 195103, 2019.
- J132.** [“Ultrafast magnetization switching in nanoscale magnetic dots”](#)
El-Ghazaly, Amal and Tran, Brandon and Ceballos, Alejandro and Lambert, Charles-Henri and Patabi, Akshay and **Salahuddin, Sayeef** and Hellman, Frances and Bokor, Jeffrey
Applied Physics Letters, 114, 23, 232407, 2019.
- J131.** [“Proposal for Capacitance Matching in Negative Capacitance Field Effect Transistors”](#)
Agarwal, H and Kushwaha, P and Lin, Y and Kao, M and Liao, Y and Dasgupta, A and **Salahuddin, S** and Hu, C
IEEE Electron Device Letters, 1, 2019.
- J130.** [“Negative Capacitance FET With 1.8-nm-Thick Zr-Doped HfO₂ Oxide”](#)
Kwon, Daewoong and Cheema, Suraj and Shanker, Nirmaan and Chatterjee, Korok and Liao, Yu-Hung and Tan, Ava J and Hu, Chenming and **Salahuddin, Sayeef**
IEEE Electron Device Letters, 40, 6, 993–996, 2019.
- J129.** [“Combining Learned Representations for Combinatorial Optimization”](#)
Patel, Saavan and **Salahuddin, Sayeef**
arXiv preprint arXiv:1909.03978, 2019.
- C59.** [“Ferroelectric Si-doped HfO₂ Capacitors for Next-Generation Memories”](#)
Tan, Ava J and Zhu, Zhongwei and Choe, Hwan Sung and Hu, Chenming and **Salahuddin, Sayeef** and Yoon, Alex
2019 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1–2, 2019.
- J128.** [“BSIM-HV: High-Voltage MOSFET Model Including Quasi-Saturation and Self-Heating Effect”](#)
Agarwal, H and Gupta, C and Goel, R and Kushwaha, P and Lin, Y-K and Kao, M-Y and Duarte, J-P and Chang, H-L and Chauhan, Y S and **Salahuddin, S** and Others
IEEE Transactions on Electron Devices, 66, 10, 4258–4263, 2019.
- J127.** [“Generation and stability of structurally imprinted target skyrmions in magnetic multilayers”](#)
Kent, Noah and Streubel, Robert and Lambert, Charles-Henri and Ceballos, Alejandro and Je, Soong-Gun and Dhuey, Scott and Im, Mi-Young and B\’uttner, Felix and Hellman, Frances and **Salahuddin, Sayeef** and Others
Applied Physics Letters, 115, 11, 112404, 2019.
- J126.** [“Anomalous Beneficial Gate-Length Scaling Trend of Negative Capacitance Transistors”](#)
Liao, Yu-Hung and Kwon, Daewoong and Lin, Yen-Kai and Tan, Ava J and Hu, Chenming and **Salahuddin, Sayeef**
IEEE Electron Device Letters, 40, 11, 1860–1863, 2019.
- J125.** [“Micromagnetic analysis and optimization of spin-orbit torque switching processes in synthetic antiferromagnets”](#)
Tremisina, E A and Roschewsky, N and **Salahuddin, S**

Journal of Applied Physics, 126, 16, 163905, 2019.

- J124.** [“Tapia: U: Your story recorded in a magnet: Micromagnetic simulations of spin-orbit torque in multi-layer structures”](#)
Tremisina, Elizaveta and **Salahuddin, S**
2018–2019 ACM Student Research Competition, 2019.
- J123.** [“Electric-Field Control of the Interlayer Exchange Coupling for Magnetization Switching”](#)
Sayed, Shehrin and Hsu, Cheng-Hsiang and Roschewsky, Niklas and Yang, See-Hun and **Salahuddin, Sayeef**
arXiv preprint arXiv:1911.00183, 2019.
- J122.** [“Near Threshold Capacitance Matching in a Negative Capacitance FET with 1 nm Effective Oxide Thickness Gate Stack”](#)
Kwon, Daewoong and Cheema, Suraj and Lin, Yen-Kai and Liao, Yu-Hung and Chatterjee, Korok and Tan, Ava J and Hu, Chenming and **Salahuddin, Sayeef**
IEEE Electron Device Letters, 41, 1, 179–182, 2019.
- C58.** [“Electric-field controlled magnetic reorientation in exchange coupled CoFeB/Ni bilayer microstructures”](#)
Xiao, Zhuyun and Conte, Roberto Lo and Goiriena, Maite and Chopdekar, Rajesh V and Li, Xiang and Tiwari, Sidhant and Lambert, Charles-Henri and **Salahuddin, Sayeef** and Carman, Gregory P and Wang, Kang and Others
Journal of Physics: Conference Series, 1407, 1, 12024, 2019.
- J121.** [“Experimental Demonstration of a Ferroelectric HfO₂-Based Content Addressable Memory Cell”](#)
Tan, Ava J and Chatterjee, Korok and Zhou, Jiuren and Kwon, Daewoong and Liao, Yu-Hung and Cheema, Suraj and Hu, Chenming and **Salahuddin, Sayeef**
IEEE Electron Device Letters, 41, 2, 240–243, 2019.
- 2018**
- J120.** [“One-Dimensional Spin Channel in Two-Dimensional Transition Metal Dichalcogenide Heterostructures”](#)
Mishra, V and **Salahuddin, S**
IEEE Transactions on Nanotechnology, 17, 5, 1053–1057, 2018.
- J119.** [“Improved Subthreshold Swing and Short Channel Effect in FDSOI n-Channel Negative Capacitance Field Effect Transistors”](#)
Kwon, D and Chatterjee, K and Tan, A J and Yadav, A K and Zhou, H and Sachid, A B and Reis, R D and Hu, C and **Salahuddin, S**
IEEE Electron Device Letters, 39, 2, 300–303, 2018.
- J118.** [“Ferroelectric negative capacitance domain dynamics”](#)
Hoffmann, Michael and Khan, Asif Islam and Serrao, Claudy and Lu, Zhongyuan and **Salahuddin, Sayeef** and Pe\’c, Milan and Slesazek, Stefan and Schroeder, Uwe and Mikolajick, Thomas
Journal of Applied Physics, 123, 18, 184101, 2018.
- J117.** [“Experimental Evidence of Chiral Ferrimagnetism in Amorphous GdCo Films”](#)
Streubel, Robert and Lambert, Charles Henri and Kent, Noah and Ercius, Peter and N’Diaye, Alpha T. and Ophus, Colin and **Salahuddin, Sayeef** and Fischer, Peter
Advanced Materials, 2018.

- J116.** [“Mapping Polarity, Toroidal Order, and the Local Energy Landscape by 4D-STEM”](#)
 Nguyen, Kayla X and Jiang, Yi and Cao, Michael C. and Purohit, Prafull and Yadav, Ajay K. and Junquera, Javier and Tate, Mark W. and Gruner, Sol M. and Ramesh, Ramamoorthy and **Salahuddin, Sayeef** and Muller, David A.
Microscopy and Microanalysis, 24, S1, 176–177, 2018.
- J115.** [“Modeling of Advanced RF Bulk FinFETs”](#)
 Kushwaha, P and Agarwal, H and Lin, Y -. and Kao, M -. and Duarte, J -. and Chang, H -. and Wong, W and Fan, J and and Y. S. Chauhan and **Salahuddin, S** and Hu, C
IEEE Electron Device Letters, 39, 6, 791–794, 2018.
- C57.** [“Scaling of all-optical switching to nanometer dimensions”](#)
 ElGhazaly, A. and Lambert, C. and Tran, B. and Pattabi, A. and Gorchon, J. and **Salahuddin, S.** and Wong, H. and Bokor, J.
2018 IEEE International Magnetics Conference (INTERMAG), 1–2, 2018.
- J114.** [“Novel Cascadable Magnetic Majority Gates for Implementing Comprehensive Logic Functions”](#)
 Li, X and Song, M and Xu, N and Luo, S and Zou, Q and Zhang, S and Hong, J and Yang, X and Min, T and Han, X and Zou, X and Zhu, J and **Salahuddin, S** and You, L
IEEE Transactions on Electron Devices, 65, 10, 4687–4693, 2018.
- C56.** [“Response Speed of Negative Capacitance FinFETs”](#)
 Kwon, D and Liao, Y and Lin, Y and Duarte, J P and Chatterjee, K and Tan, A J and Yadav, A K and Hu, C and Krivokapic, Z and **Salahuddin, S**
2018 IEEE Symposium on VLSI Technology, 49–50, 2018.
- C55.** [“Negative-Capacitance FinFET Inverter, Ring Oscillator, SRAM Cell, and Ft”](#)
 Li, K and Wei, Y and Chen, Y and Chiu, W and Chen, H and Lee, M and Chiu, Y and Hsueh, F and Wu, B and Chen, P and Lai, T and Chen, C and Shieh, J and Yeh, W and **Salahuddin, S** and Hu, C
2018 IEEE International Electron Devices Meeting (IEDM), 31.7.1–31.7.4, 2018.
- J113.** [“Electrically induced, non-volatile, metal insulator transition in a ferroelectric-controlled MoS₂ transistor”](#)
 Lu, Zhongyuan and Serrao, Claudy and Khan, Asif I. and Clarkson, James D. and Wong, Justin C. and Ramesh, Ramamoorthy and **Salahuddin, Sayeef**
Applied Physics Letters, 112, 4, 043107, 2018.
- C54.** [“Negative Capacitance, n-Channel, Si FinFETs: Bi-directional Sub-60 mV/dec, Negative DIBL, Negative Differential Resistance and Improved Short Channel Effect”](#)
 Zhou, H and Kwon, D and Sachid, A B and Liao, Y and Chatterjee, K and Tan, A J and Yadav, A K and Hu, C and **Salahuddin, S**
2018 IEEE Symposium on VLSI Technology, 53–54, 2018.
- J112.** [“A Nitrided Interfacial Oxide for Interface State Improvement in Hafnium Zirconium Oxide-Based Ferroelectric Transistor Technology”](#)
 Tan, A J and Yadav, A K and Chatterjee, K and Kwon, D and Kim, S and Hu, C and **Salahuddin, S**
IEEE Electron Device Letters, 39, 1, 95–98, 2018.
- C53.** [“Negative capacitance transistors”](#)
Salahuddin, S
2018 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1, 2018.

- C52.** [“Scaling of all-optical switching to nanometer dimensions”](#)
ElGhazaly, A and Lambert, C and Tran, B and Pattabi, A and Gorchon, J and **Salahuddin, S** and Wong, H and Bokor, J
2018 IEEE International Magnetics Conference (INTERMAG), 1–2, 2018.
- J111.** [“Negative Differential Resistance and Steep Switching in Chevron Graphene Nanoribbon Field-Effect Transistors”](#)
Smith, S and Llinus, J and Bokor, J and **Salahuddin, S**
IEEE Electron Device Letters, 39, 1, 143–146, 2018.
- C51.** [“Negative-Capacitance FinFETs: Numerical Simulation, Compact Modeling and Circuit Evaluation”](#)
Duarte, J P and Lin, Y -. and Liao, Y -. and Sachid, A and Kao, M -. and Agarwal, H and Kushwaha, P and Chatterjee, K and Kwon, D and Chang, H -. and **Salahuddin, S** and Hu, C
2018 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD), 123–128, 2018.
- J110.** [“Designing 0.5 V 5-nm HP and 0.23 V 5-nm LP NC-FinFETs With Improved ION/IOFF Sensitivity in Presence of Parasitic Capacitance”](#)
Agarwal, H and Kushwaha, P and Duarte, J P and Lin, Y and Sachid, A B and Chang, H and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 65, 3, 1211–1216, 2018.
- J109.** [“New Mobility Model for Accurate Modeling of Transconductance in FDSOI MOSFETs”](#)
Lin, Y and Kushwaha, P and Duarte, J P and Chang, H and Agarwal, H and Khandelwal, S and Sachid, A B and Harter, M and Watts, J and Chauhan, Y S and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 65, 2, 463–469, 2018.
- J108.** [“Electrically induced, non-volatile, metal insulator transition in a ferroelectric-controlled MoS₂ transistor”](#)
Lu, Zhongyuan and Serrao, Claudy and Khan, Asif I. and Clarkson, James D. and Wong, Justin C. and Ramesh, Ramamoorthy and **Salahuddin, Sayeeff**
Applied Physics Letters, 112, 4, 043107, 2018.
- Pers pective.** [“The era of hyper-scaling in electronics”](#)
Salahuddin, Sayeeff and Ni, Kai and Datta, Suman
Nature Electronics, 2018.
- C50.** [“Negative Capacitance Transistors”](#)
Salahuddin, Sayeeff
Meeting Abstracts of ECS, MA2018-01, 22, 1367–1367, 2018.
- J107.** [“Engineering Negative Differential Resistance in NCFETs for Analog Applications”](#)
Agarwal, H and Kushwaha, P and Duarte, J P and Lin, Y and Sachid, A B and Kao, M and Chang, H and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 65, 5, 2033–2039, 2018.
- J106.** [“Multidomain Phase-Field Modeling of Negative Capacitance Switching Transients”](#)
Smith, S and Chatterjee, K and **Salahuddin, S**
IEEE Transactions on Electron Devices, 65, 1, 295–298, 2018.
- J105.** [“Variation Caused by Spatial Distribution of Dielectric and Ferroelectric Grains in a Negative Capacitance Field-Effect Transistor”](#)

- Kao, M and Sachid, A B and Lin, Y and Liao, Y and Agarwal, H and Kushwaha, P and Duarte, J P and Chang, H and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 65, 10, 4652–4658, 2018.
- J104.** [“NCFET Design Considering Maximum Interface Electric Field”](#)
Agarwal, H and Kushwaha, P and Lin, Y and Kao, M and Liao, Y and Duarte, J and **Salahuddin, S** and Hu, C
IEEE Electron Device Letters, 39, 8, 1254–1257, 2018.
- J103.** [“In situ ferromagnetic resonance capability on a polarized neutron reflectometry beamline”](#)
Kostylev, Mikhail and Causer, Grace L. and Lambert, Charles-Henri and Schefer, Thomas and Weiss, Charles and Callori, Sara J. and **Salahuddin, Sayeef** and Wang, Xiaolin L. and Klose, Frank and IUCr
Journal of Applied Crystallography, 51, 1, 9–16, 2018.
- C49.** [“Effect of Polycrystallinity and Presence of Dielectric Phases on NC-FinFET Variability”](#)
Lin, Y and Kao, M and Agarwal, H and Liao, Y and Kushwaha, P and Chatterjee, K and Duarte, J P and Chang, H and **Salahuddin, S** and Hu, C
2018 IEEE International Electron Devices Meeting (IEDM), 9.4.1–9.4.4, 2018.
- J102.** [“Electrically controlled switching of the magnetization state in multiferroic BaTiO₃ / CoFe submicrometer structures”](#)
Lo Conte, R. and Gorchon, J. and Mougín, A. and Lambert, C. H. A. and El-Ghazaly, A. and Scholl, A. and **Salahuddin, S.** and Bokor, J.
Physical Review Materials, 2, 9, 091402, 2018.
- J101.** [“Voltage-driven, local, and efficient excitation of nitrogen-vacancy centers in diamond”](#)
Labanowski, Dominic and Bhallamudi, Vidya Praveen and Guo, Qiaochu and Purser, Carola M and McCullian, Brendan A and Hammel, P Chris and **Salahuddin, Sayeef**
Science Advances, 4, 9, eaat6574, 2018.
- 2017**
- J100.** [“Self-Aligned, Gate Last, FDSOI, Ferroelectric Gate Memory Device With 5.5-nm Hf_{0.8}Zr_{0.2}O₂, High Endurance and Breakdown Recovery”](#)
Chatterjee, K and Kim, S and Karbasian, G and Tan, A J and Yadav, A K and Khan, A I and Hu, C and **Salahuddin, S.**
IEEE Electron Device Letters, 38, 10, 1379–1382, 2017.
- J99.** [“A Predictive Tunnel FET Compact Model With Atomistic Simulation Validation”](#)
Lin, Y and Khandelwal, S and Duarte, J P and Chang, H and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 64, 2, 599–605, 2017.
- J98.** [“Electric current induced ultrafast demagnetization”](#)
Wilson, Richard B. and Yang, Yang and Gorchon, Jon and Lambert, Charles Henri and **Salahuddin, Sayeef** and Bokor, Jeffrey
Physical Review B, 2017.
- C48.** [“Energy efficient computing with hyperdimensional vector space models”](#)
Salahuddin, S.
2017 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD), 9–12, 2017.

- J97.** [“Implementing p-bits With Embedded MTJ”](#)
Camsari, K Y and **Salahuddin, S** and Datta, S
IEEE Electron Device Letters, 38, 12, 1767–1770, 2017.
- J96.** [“Intrinsic Limits to Contact Resistivity in Transition Metal Dichalcogenides”](#)
Mishra, V and **Salahuddin, S**.
IEEE Electron Device Letters, 38, 12, 1755–1758, 2017.
- J95.** [“Modeling of Back-Gate Effects on Gate-Induced Drain Leakage and Gate Currents in UTB SOI MOSFETs”](#)
Lin, Y and Kushwaha, P and Agarwal, H and Chang, H and Duarte, J P and Sachid, A B and Khandelwal, S and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 64, 10, 3986–3990, 2017.
- J94.** [“Differential voltage amplification from ferroelectric negative capacitance”](#)
Khan, Asif I. and Hoffmann, Michael and Chatterjee, Korok and Lu, Zhongyuan and Xu, Ruijuan and Serrao, Claudy and Smith, Samuel and Martin, Lane W. and Hu, Chenming and Ramesh, Ramamoorthy and **Salahuddin, Sayeeff**
Applied Physics Letters, 111, 25, 253501, 2017.
- C47.** [“Full chip power benefits with negative capacitance FETs”](#)
Samal, S K and Khandelwal, S and Khan, A I and **Salahuddin, S** and Hu, C and Lim, S K
2017 IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED), 1–6, 2017.
- C46.** [“Accurate Modeling of Gate-Induced Drain Leakage for III-V Mosfets”](#)
Kim, Sangwook and **Salahuddin, Sayeeff**
Meeting Abstracts of ECS, MA2017-02, 52, 2203–2203, 2017.
- J93.** [“High Speed Epitaxial Perovskite Memory on Flexible Substrates”](#)
Bakaul, Saidur R. and Serrao, Claudy R. and Lee, Oukjae and Lu, Zhongyuan and Yadav, Ajay and Carraro, Carlo and Maboudian, Roya and Ramesh, Ramamoorthy and **Salahuddin, Sayeeff**
Advanced Materials, 2017.
- J92.** [“Spin-orbit torque switching of ultralarge-thickness ferrimagnetic GdFeCo”](#)
Roschewsky, Niklas and Lambert, Charles Henri and **Salahuddin, Sayeeff**
Physical Review B, 2017.
- J91.** [“Impact of Parasitic Capacitance and Ferroelectric Parameters on Negative Capacitance FinFET Characteristics”](#)
Khandelwal, S and Duarte, J P and Khan, A I and **Salahuddin, S** and Hu, C
IEEE Electron Device Letters, 38, 1, 142–144, 2017.
- J90.** [“Effect of magnetoelastic film thickness on power absorption in acoustically driven ferromagnetic resonance”](#)
Labanowski, D. and Jung, A. and **Salahuddin, S**.
Applied Physics Letters, 111, 10, 102904, 2017.
- J89.** [“Compact Modeling Source-to-Drain Tunneling in Sub-10-nm GAA FinFET With Industry Standard Model”](#)
Lin, Y and Duarte, J P and Kushwaha, P and Agarwal, H and Chang, H and Sachid, A and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 64, 9, 3576–3581, 2017.

- J88.** [“Single shot ultrafast all optical magnetization switching of ferromagnetic Co/Pt multilayers”](#)
Gorchon, Jon and Lambert, Charles-Henri and Yang, Yang and Pattabi, Akshay and Wilson, Richard B. and **Salahuddin, Sayeeff** and Bokor, Jeffrey
Applied Physics Letters, 111, 4, 042401, 2017.
- J87.** [“Single shot ultrafast all optical magnetization switching of ferromagnetic Co/Pt multilayers”](#)
Gorchon, Jon and Lambert, Charles-Henri and Yang, Yang and Pattabi, Akshay and Wilson, Richard B. and **Salahuddin, Sayeeff** and Bokor, Jeffrey
Applied Physics Letters, 111, 4, 042401, 2017.
- J86.** [“Enabling Energy-Efficient Nonvolatile Computing With Negative Capacitance FET”](#)
Li, X and Sampson, J and Khan, A and Ma, K and George, S and Aziz, A and Gupta, S K and **Salahuddin, S** and Chang, M and Datta, S and Narayanan, V
IEEE Transactions on Electron Devices, 64, 8, 3452–3458, 2017.
- C45.** [“In quest of the next information processing substrate”](#)
Datta, S and Seabaugh, A and Niemier, M and Raychowdhury, A and Schlom, D and Jena, D and Xing, G and Wong, H - P and Pop, E and **Salahuddin, S** and Gupta, S and Guha, S
2017 54th ACM/EDAC/IEEE Design Automation Conference (DAC), 1–6, 2017.
- J85.** [“Nonvolatile MoS₂ field effect transistors directly gated by single crystalline epitaxial ferroelectric”](#)
Lu, Zhongyuan and Serrao, Claudy and Khan, Asif Islam and You, Long and Wong, Justin C. and Ye, Yu and Zhu, Hanyu and Zhang, Xiang and **Salahuddin, Sayeeff**
Applied Physics Letters, 111, 2, 023104, 2017.
- C44.** [“Partial switching of ferroelectrics for synaptic weight storage”](#)
Kinder, E W and Alessandri, C and Pandey, P and Karbasian, G and **Salahuddin, S** and Seabaugh, A
2017 75th Annual Device Research Conference (DRC), 1–2, 2017.
- J84.** [“Intrinsic speed limit of negative capacitance transistors”](#)
Chatterjee, K and Rosner, A J and **Salahuddin, S**.
IEEE Electron Device Letters, 38, 9, 1328–1330, 2017.
- J83.** [“Spin wave generation by surface acoustic waves”](#)
Li, Xu and Labanowski, Dominic and **Salahuddin, Sayeeff** and Lynch, Christopher S.
Journal of Applied Physics, 122, 4, 043904, 2017.
- J82.** [“Sustained Sub-60 mV/decade Switching via the Negative Capacitance Effect in MoS₂ Transistors”](#)
McGuire, Felicia A and Lin, Yuh-Chen and Price, Katherine and Rayner, G Bruce and Khandelwal, Sourabh and **Salahuddin, Sayeeff** and Franklin, Aaron D
Nano Letters, 17, 8, 4801–4806, 2017.
- J81.** [“Work Function Engineering for Performance Improvement in Leaky Negative Capacitance FETs”](#)
Khan, A I and Radhakrishna, U and **Salahuddin, S** and Antoniadis, D
IEEE Electron Device Letters, 38, 9, 1335–1338, 2017.
- J80.** [“Stabilization of ferroelectric phase in tungsten capped Hf_{0.8}Zr_{0.2}O₂”](#)
Karbasian, Golnaz and dos Reis, Roberto and Yadav, Ajay K. and Tan, Ava J. and Hu, Chenming and **Salahuddin, Sayeeff**
Applied Physics Letters, 111, 2, 022907, 2017.

- J79.** [“Ultrafast magnetic switching of GdFeCo with electronic heat currents”](#)
Wilson, R. B. and Gorchon, Jon and Yang, Yang and Lambert, Charles Henri and **Salahuddin, Sayeef** and Bokor, Jeffrey
Physical Review B, 2017.
- C43.** [“Ultrafast electrical switching of ferrimagnetic metals \(Conference Presentation\)”](#)
Wilson, Richard and Yang, Yang and Gorchon, Jon and Lambert, Charles-Henri and **Salahuddin, Sayeef** and Bokor, Jeffrey
Spintronics X, 10357, 41, 2017.
- J78.** [“Interface Engineering of Domain Structures in BiFeO₃ Thin Films”](#)
Chen, Deyang and Chen, Zuhuang and He, Qian and Clarkson, James D and Serrao, Claudy R and Yadav, Ajay K and Nowakowski, Mark E and Fan, Zhen and You, Long and Gao, Xingsen and Zeng, Dechang and Chen, Lang and Borisevich, Albina Y and **Salahuddin, Sayeef** and Liu, Jun-Ming and Bokor, Jeffrey
Nano Letters, 17, 1, 486–493, 2017.
- C42.** [“Ferroelectricity in HfO₂ thin films as a function of Zr doping”](#)
Karbasian, G and Tan, A and Yadav, A and Sorensen, E M H and Serrao, C R and Khan, A I and Chatterjee, K and And and **Salahuddin, S.**
2017 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1–2, 2017.
- J77.** [“Hidden Magnetic States Emergent Under Electric Field. In A Room Temperature Composite Magnetolectric Multiferroic”](#)
Clarkson, J. D. and Fina, I. and Liu, Z. Q. and Lee, Y. and Kim, J. and Frontera, C. and Cordero, K. and Wisotzki, S. and Sanchez, F. and Sort, J. and Hsu, S. L. and Ko, C. and Aballe, L. and Foerster, M. and Wu, J. and Christen, H. M. and Heron, J. T. and Schlom, D. G. and **Salahuddin, S.** and Kiuoussis, N. and Fontcuberta, J. and Marti, X. and Ramesh, R.
Scientific Reports, 7, 1, 15460, 2017.
- 2016**
- J76.** [“A 60-nm-thick enhancement mode In_{0.65}Ga_{0.35}As/InAs/In_{0.65}Ga_{0.35}As high-electron-mobility transistor fabricated using Au/Pt/Ti non-annealed ohmic technology for low-power logic applications”](#)
Fatah, Faiz Aizad and Lin, Yueh-Chin and Liu, Ren-Xuan and Yang, Kai-Chun and Lin, Tai-We and Hsu, Heng-Tung and Yang, Jung-Hsiang and Miyamoto, Yasuyuki and Iwai, Hiroshi and Hu, Chenming Calvin and **Salahuddin, Sayeef** and Chang, Edward Yi
Applied Physics Express, 9, 2, 026502, 2016.
- C41.** [“Nonvolatile memory design based on ferroelectric FETs”](#)
George, S and Ma, K and Aziz, A and Li, X and Khan, A and **Salahuddin, S** and Chang, M and Datta, S and Sampson, J and Gupta, S and Narayanan, V
2016 53rd ACM/EDAC/IEEE Design Automation Conference (DAC), 1–6, 2016.
- J75.** [“Analysis and Compact Modeling of Negative Capacitance Transistor with High ON-Current and Negative Output Differential ResistancePart II: Model Validation”](#)
Pahwa, G and Dutta, T and Agarwal, A and Khandelwal, S and **Salahuddin, S** and Hu, C and Chauhan, Y S
IEEE Transactions on Electron Devices, 63, 12, 4986–4992, 2016.
- J74.** [“Negative Capacitance Behavior in a Leaky Ferroelectric”](#)

- Khan, A I and Radhakrishna, U and Chatterjee, K and **Salahuddin, S** and Antoniadis, D A
IEEE Transactions on Electron Devices, 63, 11, 4416–4422, 2016.
- C40.** [“Circuit performance analysis of negative capacitance FinFETs”](#)
Khandelwal, S and Khan, A I and Duarte, J P and Sachid, A B and **Salahuddin, S** and Hu, C
2016 IEEE Symposium on VLSI Technology, 1–2, 2016.
- C39.** [“Compact models of negative-capacitance FinFETs: Lumped and distributed charge models”](#)
Duarte, J P and Khandelwal, S and Khan, A I and Sachid, A and Lin, Y and Chang, H
and **Salahuddin, S** and Hu, C
2016 IEEE International Electron Devices Meeting (IEDM), 30.5.1–30.5.4, 2016.
- J73.** [“An invisible non-volatile solid-state memory”](#)
Clarkson, J. and Frontera, C. and Liu, Z. Q. and Lee, Y. and Kim, J. and Cordero, K. and
Wizotsky, S. and Sanchez, F. and Sort, J. and Hsu, S. L. and Ko, C and Wu, J. and Christen, H. M.
and Heron, J. T. and Schlom, D. G. and **Salahuddin, S.** and Aballe, L. and Foerster, M. and
Kioussis, N. and Fontcuberta, J. and Fina, I. and Ramesh, R. and Marti, X.
<http://arxiv.org/abs/1604.03383>, 2016.
- Book Chap.** [“Magnetization switching and domain wall motion due to spin orbit torque”](#)
Bhowmik, Debanjan and Lee, OukJae and You, Long and **Salahuddin, Sayeef**
Nanomagnetic and spintronic devices for energy-efficient memory and computing, 165–186, 2016.
- C38.** [“Negative Capacitance Transistors”](#)
Salahuddin, Sayeef
Meeting Abstracts of ECS, MA2016-02, 30, 1958–1958, 2016.
- J72.** [“Power absorption in acoustically driven ferromagnetic resonance”](#)
Labanowski, D. and Jung, A. and **Salahuddin, S.**
Applied Physics Letters, 108, 2, 022905, 2016.
- J71.** [“Negative Capacitance in Short-Channel FinFETs Externally Connected to an Epitaxial Ferroelectric Capacitor”](#)
Khan, A I and Chatterjee, K and Duarte, J P and Lu, Z and Sachid, A and Khandelwal, S and
Ramesh, R and Hu, C and **Salahuddin, S.**
IEEE Electron Device Letters, 37, 1, 111–114, 2016.
- J70.** [“Single crystal functional oxides on silicon”](#)
Bakaul, Saidur Rahman and Serrao, Claudy Rayan and Lee, Michelle and Yeung, Chun Wing and
Sarker, Asis and Hsu, Shang-Lin and Yadav, Ajay Kumar and Dedon, Liv and You, Long and
Khan, Asif Islam and Clarkson, James David and Hu, Chenming and Ramesh, Ramamoorthy
and **Salahuddin, Sayeef**
Nature Communications, 7, 1, 10547, 2016.
- J69.** [“Direct Observation of Negative Capacitance in Polycrystalline Ferroelectric HfO₂”](#)
Hoffmann, Michael and Pe\vsii\’c, Milan and Chatterjee, Korok and Khan, Asif I. and **Salahuddin,**
Sayeef and Slesazeck, Stefan and Schroeder, Uwe and Mikolajick, Thomas
Advanced Functional Materials, 2016.
- J68.** [“Analysis and Compact Modeling of Negative Capacitance Transistor with High ON-Current and Negative Output Differential ResistancePart I: Model Description”](#)
Pahwa, G and Dutta, T and Agarwal, A and Khandelwal, S and **Salahuddin, S** and Hu, C and
Chauhan, Y S

IEEE Transactions on Electron Devices, 63, 12, 4981–4985, 2016.

- J67.** [“Effects of the Variation of Ferroelectric Properties on Negative Capacitance FET Characteristics”](#)
Lin, C and Khan, A I and **Salahuddin, S** and Hu, C
IEEE Transactions on Electron Devices, 63, 5, 2197–2199, 2016.
- C37.** [“Capacitance matching effects in negative capacitance field effect transistor”](#)
Jo, J and Khan, A I and Cho, K and Oh, S and **Salahuddin, S** and Shin, C
2016 IEEE Silicon Nanoelectronics Workshop (SNW), 174–175, 2016.
- J66.** [“Deterministic Spin Orbit Torque Switching of a Perpendicularly Polarized Magnet Using Wedge Shape of the Magnet”](#)
Bhowmik, Debanjan and **Salahuddin, Sayeef**
SPIN, 06, 02, 1640008, 2016.
- J65.** [“Mechanical back-action of a spin-wave resonance in a magnetoelastic thin film on a surface acoustic wave”](#)
Gowtham, P. G. and Labanowski, D. and **Salahuddin, S.**
Physical Review B, 2016.
- C36.** [“Review of negative capacitance transistors”](#)
Salahuddin, S.
2016 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1, 2016.
- J64.** [“Unified Compact Model Covering Drift-Diffusion to Ballistic Carrier Transport”](#)
Khandelwal, S and Agarwal, H and Kushwaha, P and Duarte, J P and Medury, A and Chauhan, Y S and **Salahuddin, S** and Hu, C
IEEE Electron Device Letters, 37, 2, 134–137, 2016.
- J63.** [“Spin-orbit torques in ferrimagnetic GdFeCo alloys”](#)
Roschewsky, Niklas and Matsumura, Tomoya and Cheema, Suraj and Hellman, Frances and Kato, Takeshi and Iwata, Satoshi and **Salahuddin, Sayeef**
Applied Physics Letters, 109, 11, 112403, 2016.
- J62.** [“Surface states in a monolayer MoS₂ transistor”](#)
Lu, Zhongyuan and Lee, Oukjae and Wong, Justin C. and **Salahuddin, Sayeef**
Journal of Materials Research, 31, 07, 911–916, 2016.
- 2015**
- J61.** [“Flexible spin-orbit torque devices”](#)
Lee, OukJae and You, Long and Jang, Jaewon and Subramanian, Vivek and **Salahuddin, Sayeef**
Applied Physics Letters, 107, 25, 252401, 2015.
- J60.** [“Voltage-Controlled Ferroelastic Switching in Pb\(Zr_{0.2}Ti_{0.8}\)O₃ Thin Films”](#)
Khan, Asif Islam and Marti, Xavier and Serrao, Claudy and Ramesh, Ramamoorthy and **Salahuddin, Sayeef**
Nano Letters, 15, 4, 2229–2234, 2015.
- C35.** [“Understanding negative capacitance dynamics in ferroelectric capacitors”](#)
Khan, A I and Chatterjee, K and Ramesh, R and **Salahuddin, S.**
2015 Fourth Berkeley Symposium on Energy Efficient Electronic Systems (E3S), 1–3, 2015.
- J59.** [“Negative capacitance in a ferroelectric capacitor”](#)

- Khan, Asif Islam and Chatterjee, Korok and Wang, Brian and Drapcho, Steven and You, Long and Serrao, Claudy and Bakaul, Saidur Rahman and Ramesh, Ramamoorthy and **Salahuddin, Sayeeff** *Nature Materials*, 14, 2, 182–186, 2015.
- J58.** [“Screening in Ultrashort \(5 nm\) Channel MoS₂ Transistors: A Full-Band Quantum Transport Study”](#)
Mishra, V and Smith, S and Liu, L and Zahid, F and Zhu, Y and Guo, H and **Salahuddin, S.** *IEEE Transactions on Electron Devices*, 62, 8, 2457–2463, 2015.
- J57.** [“Deterministic Domain Wall Motion Orthogonal To Current Flow Due To Spin Orbit Torque”](#)
Bhowmik, Debanjan and Nowakowski, Mark E. and You, Long and Lee, OukJae and Keating, David and Wong, Mark and Bokor, Jeffrey and **Salahuddin, Sayeeff** *Scientific Reports*, 5, 1, 11823, 2015.
- Pers** [“Memory leads the way to better computing”](#)
pective. Wong, H.-S. Philip and **Salahuddin, Sayeeff** *Nature Nanotechnology*, 10, 3, 191–194, 2015.
- C34.** [“Negative capacitance in ferroelectric materials and implications for steep transistors”](#)
Khan, A and **Salahuddin, S.** *2015 IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S)*, 1–3, 2015.
- C33.** [“Sub-60mV-swing negative-capacitance FinFET without hysteresis”](#)
Li, K and Chen, P and Lai, T and Lin, C and Cheng, C and Chen, C and Wei, Y and Hou, Y and Liao, M and Lee, M and Chen, M and Sheih, J and Yeh, W and Yang, F and **Salahuddin, S** and Hu, C
2015 IEEE International Electron Devices Meeting (IEDM), 22.6.1–22.6.4, 2015.
- J56.** [“Direct optical detection of current induced spin accumulation in metals by magnetization-induced second harmonic generation”](#)
Pattabi, A. and Gu, Z. and Gorchon, J. and Yang, Y. and Finley, J. and Lee, O. J. and Raziq, H. A. and **Salahuddin, S.** and Bokor, J. *Applied Physics Letters*, 107, 15, 152404, 2015.
- J55.** [“Highly crystalline MoS₂ thin films grown by pulsed laser deposition”](#)
Serrao, Claudy R. and Diamond, Anthony M. and Hsu, Shang-Lin and You, Long and Gadgil, Sushant and Clarkson, James and Carraro, Carlo and Maboudian, Roya and Hu, Chenming and **Salahuddin, Sayeeff** *Applied Physics Letters*, 106, 5, 052101, 2015.
- J54.** [“Large resistivity modulation in mixed-phase metallic systems”](#)
Lee, Yeonbae and Liu, Z. Q. and Heron, J. T. and Clarkson, J. D. and Hong, J. and Ko, C. and Biegalski, M. D. and Aschauer, U. and Hsu, S. L. and Nowakowski, M. E. and Wu, J. and Christen, H. M. and **Salahuddin, S.** and Bokor, J. B. and Spaldin, N. A. and Schlom, D. G. and Ramesh, R. *Nature Communications*, 2015.
- J53.** [“Switching of perpendicularly polarized nanomagnets with spin orbit torque without an external magnetic field by engineering a tilted anisotropy.”](#)
You, Long and Lee, OukJae and Bhowmik, Debanjan and Labanowski, Dominic and Hong, Jeongmin and Bokor, Jeffrey and **Salahuddin, Sayeeff** *Proceedings of the National Academy of Sciences of the United States of America*, 112, 33, 10310–

5, 2015.

- J52.** [“Probing electric field control of magnetism using ferromagnetic resonance”](#)
Zhou, Ziyao and Trassin, Morgan and Gao, Ya and Gao, Yuan and Qiu, Diana and Ashraf, Khalid and Nan, Tianxiang and Yang, Xi and Bowden, S. R. and Pierce, D. T. and Stiles, M. D. and Unguris, J. and Liu, Ming and Howe, Brandon M. and Brown, Gail J. and **Salahuddin, S.** and Ramesh, R. and Sun, Nian X.
Nature Communications, 2015.
- Book Chap.** [“Extending CMOS with negative capacitance”](#)
Khan, Asif Islam and **Salahuddin, Sayeef**
CMOS and Beyond: Logic Switches for Terascale Integrated Circuits, 56–76, 2015.
- J51.** [“Modeling SiGe FinFETs With Thin Fin and Current-Dependent Source/Drain Resistance”](#)
Khandelwal, S and Duarte, J P and Medury, A and Chauhan, Y S and **Salahuddin, S.** and Hu, C
IEEE Electron Device Letters, 36, 7, 636–638, 2015.
- C32.** [“0.2V adiabatic NC-FinFET with 0.6mA/ \$\mu\$ m ION and 0.1nA/ \$\mu\$ m IOFF”](#)
Hu, C and **Salahuddin, S.** and Lin, C and Khan, A
2015 73rd Annual Device Research Conference (DRC), 39–40, 2015.
- 2014**
- J50.** [“Gate Recessed Quasi-Normally OFF Al₂O₃/AlGa_N/Ga_N MIS-HEMT With Low Threshold Voltage Hysteresis Using PEALD AlN Interfacial Passivation Layer”](#)
Hsieh, T and Chang, E Y and Song, Y and Lin, Y and Wang, H and Liu, S and **Salahuddin, S** and Hu, C C
IEEE Electron Device Letters, 35, 7, 732–734, 2014.
- C31.** [“Negative capacitance in ferroelectric materials and its potential use for transistors with \$lt;60\$ mV/decade subthreshold swing”](#)
Khan, A I and **Salahuddin, S**
2014 Silicon Nanoelectronics Workshop (SNW), 1–2, 2014.
- C30.** [“Can piezoelectricity lead to negative capacitance?”](#)
Wong, J C and **Salahuddin, S**
2014 IEEE International Electron Devices Meeting, 13.5.1–13.5.4, 2014.
- J49.** [“Real-Time Observation of Local Strain Effects on Nonvolatile Ferroelectric Memory Storage Mechanisms”](#)
Winkler, Christopher R and Jablonski, Michael L and Ashraf, Khalid and Damodaran, Anoop R and Jambunathan, Karthik and Hart, James L and Wen, Jianguo G and Miller, Dean J and Martin, Lane W and **Salahuddin, Sayeef** and Taheri, Mitra L
Nano Letters, 14, 6, 3617–3622, 2014.
- J48.** [“Room-temperature antiferromagnetic memory resistor”](#)
Marti, X. and Fina, I. and Frontera, C. and Liu, Jian and Wadley, P. and He, Q. and Paull, R. J. and Clarkson, J. D. and Kudrnovsk\`y, J. and Turek, I. and Kune\`s, J. and Yi, D. and Chu, J. H. and Nelson, C. T. and You, L. and Arenholz, E. and **Salahuddin, S.** and Fontcuberta, J. and Jungwirth, T. and Ramesh, R.
Nature Materials, 2014.
- J47.** [“Electrical Characteristics of n, p-In_{0.53}Ga_{0.47}As MOSCAPs With In Situ PEALD-AlN Interfacial](#)

- [Passivation Layer](#)
Luc, Q H and Chang, E Y and Trinh, H D and Lin, Y C and Nguyen, H Q and Wong, Y Y and Do, H B and **Salahuddin, S** and Hu, C C
IEEE Transactions on Electron Devices, 61, 8, 2774–2778, 2014.
- J46.** [“Deterministic switching of ferromagnetism at room temperature using an electric field”](#)
Heron, J. T. and Bosse, J. L. and He, Q. and Gao, Y. and Trassin, M. and Ye, L. and Clarkson, J. D. and Wang, C. and Liu, Jian and **Salahuddin, S.** and Ralph, D. C. and Schlom, D. G. and T̃niguez, J. and Huey, B. D. and Ramesh, R.
Nature, 2014.
- J45.** [“Magnetic domain-wall motion twisted by nanoscale probe-induced spin transfer”](#)
Wang, J. and Xie, L. S. and Wang, C. S. and Zhang, H. Z. and Shu, L. and Bai, J. and Chai, Y. S. and Zhao, X. and Nie, J. C. and Cao, C. B. and Gu, C. Z. and Xiong, C. M. and Sun, Y. and Shi, J. and **Salahuddin, S.** and Xia, K. and Nan, C. W. and Zhang, J. X.
Physical Review B – Condensed Matter and Materials Physics, 2014.
- J44.** [“Room-Temperature Negative Capacitance in a Ferroelectric–Dielectric Superlattice Heterostructure”](#)
Gao, Weiwei and Khan, Asif and Marti, Xavi and Nelson, Chris and Serrao, Claudy and Ravichandran, Jayakanth and Ramesh, Ramamoorthy and **Salahuddin, Sayeef**
Nano Letters, 14, 10, 5814–5819, 2014.
- J43.** [“Spin hall effect clocking of nanomagnetic logic without a magnetic field”](#)
Bhowmik, Debanjan and You, Long and **Salahuddin, Sayeef**
Nature Nanotechnology, 2014.
- J42.** [“The effects of strain relaxation on the dielectric properties of epitaxial ferroelectric Pb\(Zr_{0.2}Ti_{0.8}\)TiO₃ thin films”](#)
Khan, Asif Islam and Yu, Pu and Trassin, Morgan and Lee, Michelle J. and You, Long and **Salahuddin, Sayeef**
Applied Physics Letters, 105, 2, 022903, 2014.
- 2013**
- C29.** [“Device design considerations for ultra-thin body non-hysteretic negative capacitance FETs”](#)
Yeung, Chun Wing and Khan, Asif I. and **Salahuddin, Sayeef** and Hu, Chenming
2013 Third Berkeley Symposium on Energy Efficient Electronic Systems (E3S), 1–2, 2013.
- J41.** [“High Performance Molybdenum Disulfide Amorphous Silicon Heterojunction Photodetector”](#)
Esmacili-Rad, Mohammad R. and **Salahuddin, Sayeef**
Scientific Reports, 3, 1, 2345, 2013.
- J40.** [“Phenomenological Compact Model for QM Charge Centroid in Multigate FETs”](#)
Venugopalan, S and Karim, M A and **Salahuddin, S** and Niknejad, A M and Hu, C C
IEEE Transactions on Electron Devices, 60, 4, 1480–1484, 2013.
- C28.** [“Dependence of intrinsic performance of transition metal dichalcogenide transistors on materials and number of layers at the 5 nm channel-length limit”](#)
Mishra, V and Smith, S and Ganapathi, K and **Salahuddin, S**
2013 IEEE International Electron Devices Meeting, 5.6.1–5.6.4, 2013.
- J39.** [“Progress, Challenges, and Opportunities in Two-Dimensional Materials Beyond Graphene”](#)

Butler, Sheneve Z and Hollen, Shawna M and Cao, Linyou and Cui, Yi and Gupta, Jay A and Gutierrez, Humberto R and Heinz, Tony F and Hong, Seung Sae and Huang, Jiaying and Ismach, Ariel F and Johnston-Halperin, Ezekiel and Kuno, Masaru and Plashnitsa, Vladimir V and Robinson, Richard D and Ruoff, Rodney S and **Salahuddin, Sayeeff** and Shan, Jie and Shi, Li and Spencer, Michael G and Terrones, Mauricio and Windl, Wolfgang and Goldberger, Joshua E *ACS Nano*, 7, 4, 2898–2926, 2013.

- C27. [“Low power negative capacitance FETs for future quantum-well body technology”](#)
Yeung, C W and Khan, A I and Sarker, A and **Salahuddin, S** and Hu, C
2013 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1–2, 2013.
- J38. [“Electrothermal analysis of spin-transfer-torque random access memory arrays”](#)
Chatterjee, Subho and **Salahuddin, Sayeeff** and Kumar, Satish and Mukhopadhyay, Saibal
ACM Journal on Emerging Technologies in Computing Systems, 9, 2, 1–17, 2013.
- J37. [“Ballistic I-V Characteristics of Short-Channel Graphene Field-Effect Transistors: Analysis and Optimization for Analog and RF Applications”](#)
Ganapathi, K and Yoon, Y and Lundstrom, M and **Salahuddin, S**
IEEE Transactions on Electron Devices, 60, 3, 958–964, 2013.
- C26. [“Device design considerations for ultra-thin body non-hysteretic negative capacitance FETs”](#)
Yeung, C W and Khan, A I and **Salahuddin, S** and Hu, C
2013 Third Berkeley Symposium on Energy Efficient Electronic Systems (E3S), 1–2, 2013.
- News & Views. [“A new spin on spintronics”](#)
Salahuddin, Sayeeff
Nature, 2013.
- 2012
- J36. [“Dense Electron System from Gate-Controlled Surface Metal-Insulator Transition”](#)
Liu, Kai and Fu, Deyi and Cao, Jinbo and Suh, Joonki and Wang, Kevin X and Cheng, Chun and Ogletree, D Frank and Guo, Hua and Sengupta, Shamashis and Khan, Asif and Yeung, Chun Wing and **Salahuddin, Sayeeff** and Deshmukh, Mandar M and Wu, Junqiao
Nano Letters, 12, 12, 6272–6277, 2012.
- J35. [“Dissipative transport in rough edge graphene nanoribbon tunnel transistors”](#)
Yoon, Youngki and **Salahuddin, Sayeeff**
Applied Physics Letters, 101, 26, 263501, 2012.
- J34. [“Phase field model of domain dynamics in micron scale, ultrathin ferroelectric films: Application for multiferroic bismuth ferrite”](#)
Ashraf, Khalid and **Salahuddin, Sayeeff**
Journal of Applied Physics, 112, 7, 074102, 2012.
- J33. [“Zener tunneling: Congruence between semi-classical and quantum ballistic formalisms”](#)
Ganapathi, Kartik and **Salahuddin, Sayeeff**
Journal of Applied Physics, 111, 12, 124506, 2012.
- C25. [“Non-hysteretic Negative Capacitance FET with Sub-30mV/dec Swing over 106X Current Range and ION of 0.3 mA/μm without Strain Enhancement at 0.3 V”](#)
Yeung, CW and Khan, AI and Cheng, J-Y and **Salahuddin, Sayeeff** and Hu, C

SISPAD, 257–259, 2012.

- J32.** [“Effect of anti-ferromagnet surface moment density on the hysteresis properties of exchange coupled antiferromagnet-ferromagnet systems: The case of bismuth-ferrite”](#)
Ashraf, Khalid and **Salahuddin, Sayeef**
Journal of Applied Physics, 111, 10, 103904, 2012.
- J31.** [“Voltage Asymmetry of Spin-Transfer Torques”](#)
Datta, D and Behin-Aein, B and Datta, S and **Salahuddin, S.**
IEEE Transactions on Nanotechnology, 11, 2, 261–272, 2012.
- C24.** [“Electric field induced magnetic switching at room temperature: Switching speed, device scaling and switching energy”](#)
Ashraf, K and Smith, S and **Salahuddin, S.**
2012 International Electron Devices Meeting, 26.5.1–26.5.4, 2012.
- C23.** [“Can quasi-saturation in the output characteristics of short-channel graphene field-effect transistors be engineered?”](#)
Ganapathi, K and Lundstrom, M and **Salahuddin, S.**
70th Device Research Conference, 85–86, 2012.
- J30.** [“Impact of Self-Heating on Reliability of a Spin-Torque-Transfer RAM Cell”](#)
Chatterjee, S and **Salahuddin, S.** and Kumar, S and Mukhopadhyay, S
IEEE Transactions on Electron Devices, 59, 3, 791–799, 2012.
- J29.** [“Non-volatile spin switch for Boolean and non-Boolean logic”](#)
Datta, Supriyo and **Salahuddin, Sayeef** and Behin-Aein, Behtash
Applied Physics Letters, 101, 25, 252411, 2012.
- C22.** [“Possible route to low current, high speed, dynamic switching in a perpendicular anisotropy CoFeB-MgO junction using Spin Hall Effect of Ta”](#)
Bhowmik, D and You, L and **Salahuddin, S.**
2012 International Electron Devices Meeting, 29.7.1–29.7.4, 2012.
- C21.** [“Negative capacitance in a ferroelectric-dielectric heterostructure for ultra low-power computing”](#)
Salahuddin, Sayeef
Proceedings of SPIE, 8461, 846111, 2012.
- 2011**
- C20.** [“Scaling study of graphene transistors”](#)
Yoon, Y and Nikonov, D E and **Salahuddin, S.**
2011 11th IEEE International Conference on Nanotechnology, 1568–1571, 2011.
- J28.** [“Role of phonon scattering in graphene nanoribbon transistors: Nonequilibrium Green’s function method with real space approach”](#)
Yoon, Youngki and Nikonov, Dmitri E. and **Salahuddin, Sayeef**
Applied Physics Letters, 98, 20, 203503, 2011.
- C19.** [“Monolayer MoS₂ transistors – ballistic performance limit analysis”](#)
Ganapathi, K and Yoon, Y and **Salahuddin, S.**
69th Device Research Conference, 79–80, 2011.
- J27.** [“Built-in and induced polarization across LaAlO₃/SrTiO₃ heterojunctions”](#)

- Singh-Bhalla, Guneeta and Bell, Christopher and Ravichandran, Jayakanth and Siemons, Wolter and Hikita, Yasuyuki and **Salahuddin, Sayeef** and Hebard, Arthur F. and Hwang, Harold Y. and Ramesh, Ramamoorthy
Nature Physics, 2011.
- J26.** [“Electric-field-induced magnetization reversal in a ferromagnet-multiferroic heterostructure”](#)
Heron, J. T. and Trassin, M. and Ashraf, K. and Gajek, M. and He, Q. and Yang, S. Y. and Nikonov, D. E. and Chu, Y. H. and **Salahuddin, S.** and Ramesh, R.
Physical Review Letters, 2011.
- C18.** [“Simulation of Carbon Heterostructures as Barrier Free Tunneling Transistors”](#)
Yoon, Youngki and **Salahuddin, Sayeef**
ECS Transactions, 35, 3, 253–258, 2011.
- C17.** [“Performance assessment of partially unzipped carbon nanotube field-effect transistors”](#)
Yoon, Y and **Salahuddin, S.**
2011 IEEE/ACM International Symposium on Nanoscale Architectures, 157–161, 2011.
- J25.** [“Built-in and induced polarization across LaAlO₃/SrTiO₃ heterojunctions”](#)
Singh-Bhalla, Guneeta and Bell, Christopher and Ravichandran, Jayakanth and Siemons, Wolter and Hikita, Yasuyuki and **Salahuddin, Sayeef** and Hebard, Arthur F. and Hwang, Harold Y. and Ramesh, Ramamoorthy
Nature Physics, 2011.
- J24.** [“Intrinsic Cut-off Frequency in Scaled Graphene Transistors”](#)
Ganapathi, Kartik and Yoon, Youngki and **Salahuddin, Sayeef**
<http://arxiv.org/abs/1110.6211>, 2011.
- J23.** [“How Good Can Monolayer MoS₂ Transistors Be?”](#)
Yoon, Youngki and Ganapathi, Kartik and **Salahuddin, Sayeef**
Nano Letters, 11, 9, 3768–3773, 2011.
- C16.** [“Ferroelectric negative capacitance MOSFET: Capacitance tuning amp; antiferroelectric operation”](#)
Khan, A I and Yeung, C W and and **S. Salahuddin**
2011 International Electron Devices Meeting, 11.3.1–11.3.4, 2011.
- J22.** [“Experimental evidence of ferroelectric negative capacitance in nanoscale heterostructures”](#)
Islam Khan, Asif and Bhowmik, Debanjan and Yu, Pu and Joo Kim, Sung and Pan, Xiaoqing and Ramesh, Ramamoorthy and **Salahuddin, Sayeef**
Applied Physics Letters, 99, 11, 113501, 2011.
- J21.** [“Heterojunction Vertical Band-to-Band Tunneling Transistors for Steep Subthreshold Swing and High on Current”](#)
Ganapathi, K and **Salahuddin, S.**
IEEE Electron Device Letters, 32, 5, 689–691, 2011.
- C15.** [“Proposal for piezoelectric-ferromagnet bilayer based microwave oscillators without any external magnetic field or spin transfer torque”](#)
Bhowmik, D and **Salahuddin, S.**
69th Device Research Conference, 163–164, 2011.

2010

- J20.** [“Dual-Source-Line-Bias Scheme to Improve the Read Margin and Sensing Accuracy of STTRAM in Sub-90-nm Nodes”](#)
Chatterjee, S and **Salahuddin, S.** and Mukhopadhyay, S
IEEE Transactions on Circuits and Systems II: Express Briefs, 57, 3, 208–212, 2010.
- J19.** [“Performance analysis of carbon-based tunnel field-effect transistors for high frequency and ultralow power applications”](#)
Yoon, Youngki and Kim, Sung Hwan and **Salahuddin, Sayeeff**
Applied Physics Letters, 97, 23, 233504, 2010.
- J18.** [“Design Paradigm for Robust Spin-Torque Transfer Magnetic RAM \(STT MRAM\) From Circuit/Architecture Perspective”](#)
Li, J and Ndai, P and Goel, A and **Salahuddin, S.** and Roy, K
IEEE Transactions on Very Large Scale Integration (VLSI) Systems, 18, 12, 1710–1723, 2010.
- C14.** [“Quantitative model for TMR and spin-transfer torque in MTJ devices”](#)
Datta, D and Behin-Aein, B and **Salahuddin, S.** and Datta, S
2010 International Electron Devices Meeting, 22.8.1–22.8.4, 2010.
- J17.** [“Ultrathin compound semiconductor on insulator layers for high-performance nanoscale transistors”](#)
Ko, Hyunhyub and Takei, Kuniharu and Kapadia, Rehan and Chuang, Steven and Fang, Hui and Leu, Paul W. and Ganapathi, Kartik and Plis, Elena and Kim, Ha Sul and Chen, Szu Ying and Madsen, Morten and Ford, Alexandra C. and Chueh, Yu Lun and Krishna, Sanjay and **Salahuddin, Sayeeff** and Javey, Ali
Nature, 2010.
- J16.** [“Proposal for an all-spin logic device with built-in memory”](#)
Behin-Aein, Behtash and Datta, Deepanjan and **Salahuddin, Sayeeff** and Datta, Supriyo
Nature Nanotechnology, 2010.
- J15.** [“Analysis of InAs vertical and lateral band-to-band tunneling transistors: Leveraging vertical tunneling for improved performance”](#)
Ganapathi, Kartik and Yoon, Youngki and **Salahuddin, Sayeeff**
Applied Physics Letters, 97, 3, 033504, 2010.
- J14.** [“Inverse temperature dependence of subthreshold slope in graphene nanoribbon tunneling transistors”](#)
Yoon, Youngki and **Salahuddin, Sayeeff**
Applied Physics Letters, 96, 1, 013510, 2010.
- J13.** [“Barrier-free tunneling in a carbon heterojunction transistor”](#)
Yoon, Youngki and **Salahuddin, Sayeeff**
Applied Physics Letters, 97, 3, 033102, 2010.
- C13.** [“Analysis of thermal behaviors of Spin-Torque-Transfer RAM: A simulation study”](#)
Chatterjee, S and **Salahuddin, S.** and Kumar, S and Mukhopadhyay, S
2010 ACM/IEEE International Symposium on Low-Power Electronics and Design (ISLPED), 13–18, 2010.
- C12.** [“Comparative analysis of the performance of InAs lateral and vertical band-to-band tunneling transistors”](#)
Ganapathi, K and Yoon, Y and **Salahuddin, S.**

68th Device Research Conference, 57–58, 2010.

- C11. [“Structure and doping effects in carbon heterojunction FETs towards barrier-free inter-band tunneling”](#)

Yoon, Y and **Salahuddin, S.**

68th Device Research Conference, 215–216, 2010.

2009

- J12. [“Non-Linear Temperature Dependence in Graphene Nanoribbon Tunneling Transistors”](#)

Yoon, Youngki and **Salahuddin, Sayeeff**

<http://arxiv.org/abs/0909.5445>, 2009.

- C10. [“Modeling of the self-heating in STTRAM and analysis of its impact on reliable memory operations”](#)

Chatterjee, S and **Salahuddin, S.** and Kumar, S and Mukhopadhyay, S

2009 10th Annual Non-Volatile Memory Technology Symposium (NVMTS), 86–89, 2009.

- J11. [“Switching Energy of Ferromagnetic Logic Bits”](#)

Behin-Aein, B and **Salahuddin, S.** and Datta, S

IEEE Transactions on Nanotechnology, 8, 4, 505–514, 2009.

2008

- C9. [“Modeling of failure probability and statistical design of Spin-Torque Transfer Magnetic Random Access Memory \(STT MRAM\) array for yield enhancement”](#)

Li, J and Augustine, C and **Salahuddin, S.** and Roy, K

2008 45th ACM/IEEE Design Automation Conference, 278–283, 2008.

- J10. [“Spin Transfer Torque as a Non-Conservative Pseudo-Field”](#)

Salahuddin, Sayeeff and Datta, Deepanjan and Datta, Supriyo

<http://arxiv.org/abs/0811.3472>, 2008.

- C8. [“Can the subthreshold swing in a classical FET be lowered below 60 mV/decade?”](#)

Salahuddin, S. and Datta, S

2008 IEEE International Electron Devices Meeting, 1–4, 2008.

- C7. [“Key Role of Non Equilibrium Spin Density in Determining Spin Torque”](#)

Salahuddin, S. and Datta, D and Datta, S

2008 Device Research Conference, 161–162, 2008.

- C6. [“Variation-tolerant Spin-Torque Transfer \(STT\) MRAM array for yield enhancement”](#)

Li, J and **S. Salahuddin** and Roy, K

2008 IEEE Custom Integrated Circuits Conference, 193–196, 2008.

- J9. [“Use of Negative Capacitance to Provide Voltage Amplification for Low Power Nanoscale Devices”](#)

Salahuddin, Sayeeff and Datta, Supriyo

Nano Letters, 8, 2, 405–410, 2008.

2007

- J8. [“Interacting systems for self-correcting low power switching”](#)

Salahuddin, Sayeeff and Datta, Supriyo

Applied Physics Letters, 90, 9, 093503, 2007.

- C5. [“Simulation of Spin Torque Devices with Inelastic Spin flip Scattering”](#)
Salahuddin, S. and Datta, S
2007 65th Annual Device Research Conference, 249–250, 2007.
- C4. [“Quantum Transport Simulation of Tunneling Based Spin Torque Transfer \(STT\) Devices: Design Trade offs and Torque Efficiency”](#)
Salahuddin, S. and Datta, D and Srivastava, P and Datta, S
2007 IEEE International Electron Devices Meeting, 121–124, 2007.
- 2006
- C3. [“Integrating Spintronics with Conventional Semiconductor Devices through Exchange Interaction”](#)
Salahuddin, S. and Srivastava, P and Datta, S
2006 64th Device Research Conference, 233–234, 2006.
- C2. [“An All Electrical Spin Detector”](#)
Salahuddin, S. and Datta, S
2006 Sixth IEEE Conference on Nanotechnology, 2, 834–837, 2006.
- J7. [“Self-consistent simulation of quantum transport and magnetization dynamics in spin-torque based devices”](#)
Salahuddin, Sayeeff and Datta, Supriyo
Applied Physics Letters, 89, 15, 153504, 2006.
- J6. [“High-frequency performance projections for ballistic carbon-nanotube transistors”](#)
Hasan, S and **Salahuddin, S.** and Vaidyanathan, M and Alam, M A
IEEE Transactions on Nanotechnology, 5, 1, 14–22, 2006.
- C1. [“Self-Consistent Simulation of Hybrid Spintronic Devices”](#)
Salahuddin, S. and Datta, S
2006 International Electron Devices Meeting, 1–4, 2006.
- J5. [“Electrical detection of spin excitations”](#)
Salahuddin, Sayeeff and Datta, Supriyo
Physical Review B – Condensed Matter and Materials Physics, 2006.
- 2005
- J4. [“Transport effects on signal propagation in quantum wires”](#)
Salahuddin, S. and Lundstrom, M and Datta, S
IEEE Transactions on Electron Devices, 52, 8, 1734–1742, 2005.
- 2004
- J3. [“Reducing signal-bias from MAD estimated noise level for DCT speech enhancement”](#)
Hasan, Md Kamrul and **Salahuddin, Sayeeff** and Rezwana Khan, M.
Signal Processing, 2004.
- J2. [“A modified a priori SNR for speech enhancement using spectral subtraction rules”](#)
Hasan, M K and **Salahuddin, S.** and Khan, M R
IEEE Signal Processing Letters, 11, 4, 450–453, 2004.

2002

- J1. [“Soft thresholding for DCT speech enhancement”](#)
Salahuddin, S. and Al Islam, S Z and Hasan, Md K and Khan, M R
Electronics letters, 2002.

INVITED TALKS

[132] **Sayeeff Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” **Plenary Speech**, International Symposium on Applications of Ferroelectrics (ISAF), June, 2022.

[131] **Sayeeff Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” **Plenary Speech**, Symposium on Advances in Device Concepts and Applications, King Fahd University of Petroleum and Minerals, March, 2022.

[130] **Sayeeff Salahuddin**, “FE-FETs for Near-Memory and In-Memory Compute,” **IEEE International Electron Devices Meeting (IEDM)**, December, 2021.

[129] **Sayeeff Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” Electrochemical Society, October, 2021.

[128] **Sayeeff Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” Symposium on International Roadmap for Devices and Systems (IRDS), September, 2021.

[127] **Sayeeff Salahuddin**, “Compute in Memory,” DARPA ERI Summit Workshop on Memory Centric Computing, August, 2020.

[126] **Sayeeff Salahuddin**, “Towards Embedded Ferroelectric Memory,” **DARPA ERI Summit Podium Presentation, August, 2021.**

[125] **Sayeeff Salahuddin**, “Negative Capacitance,” **Panelist in Device Research Conference (DRC), June 2022.**

[124] **Sayeeff Salahuddin**, “The Role of Academia in Identifying Compelling Devices and Materials,” **Panelist in Symposium on VLSI Technology, June, 2021.**

[123] **Sayeeff Salahuddin**, “Ferroelectricity and Negative Capacitance in Ultra-thin Layers of HfO₂ Based Fluorite Oxides,” NAMLAB Workshop in Ferroelectrics, Dresden, Germany, May, 2021.

[122] **Sayeeff Salahuddin**, “FE-FET as a potential FEOL, Non-Volatile, Compute-in-Memory Technology,” NSF workshop on computing in memory, May, 2021.

[121] **Sayeeff Salahuddin**, “FE-FET Memory,” SRC Technology Forum, NSF workshop on next generation computing, May, 2021.

- [120] **Sayeeef Salahuddin**, “Ising Computing: Compositional Training and Parallel Asynchronous Sampling,” DARPA Microelectronics Consortium (MEC) workshop on Ising computing, May, 2021.
- [119] **Sayeeef Salahuddin**, “Negative Capacitance,” **Material Research Society (MRS) Spring Meeting, April, 2021.**
- [118] **Sayeeef Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” **Chey Institute Distinguished Lecture, April, 2021.**
- [117] **Sayeeef Salahuddin**, “Ultrathin Ferroelectricity and Its Application in Advanced Logic and Memory Devices,” **IEEE International Reliability Physics Symposium (IRPS), March, 2021.**
- [116] **Sayeeef Salahuddin**, “1 nm Ferroelectric on Silicon and Application for Energy Efficient Logic and Memory Devices,” IEEE Electron Devices Society (EDS) Webinar, February, 2021.
- [115] **Sayeeef Salahuddin**, “Recapturing US Leadership in Semiconductors” NSF CISE Workshop on Computing, December, 2020.
- [114] **Sayeeef Salahuddin**, “Gate Stack Optimization for Ferroelectric Field Effect Transistors,” DARPA ERI Summit, August, 2020.
- [113] **Sayeeef Salahuddin**, “Spin Orbit Interaction in Fe(x)Si(1-x)/Co bi-layers,” 31st Magnetic Recording Conference, August, 2020.
- [112] **Sayeeef Salahuddin**, “Negative Capacitance Transistors,” Tutorial on Negative Capacitance, Design Automation Conferences (DAC), July 2020.
- [111] **Sayeeef Salahuddin**, “Negative Capacitance RF Devices, ” AFRL, July 2020.
- [110] **Sayeeef Salahuddin**, “Negative Capacitance Transistors, ” KAUST, November, 2019.
- [109] **Sayeeef Salahuddin**, “Negative Capacitance,” Institute of New Era Electronics Distinguished Seminar, Purdue University, October 17, 2019.
- [108] **Sayeeef Salahuddin**, “Novel physics for next generation agile computing,” Microelectronics Workshop, Argonne National Laboratory, October, 2019.
- [107] **Sayeeef Salahuddin**, “Negative Capacitance, Ultra-thin Ferroelectrics and Applications,” International Workshop on Oxide Electronics, Kyoto, October, 2019.
- [106] **Sayeeef Salahuddin**, “Negative Capacitance for next generation Edge Intelligence,” DARPA ERI Workshop, July, 2019.
- [105] **Sayeeef Salahuddin**, “Exploiting new physics for next generation AI”, CASPA Summer Symposium: Breaking the Memory Wall, the AI Bottleneck, Jul 13, 2019
- [104] **Sayeeef Salahuddin**, “Negative Capacitance Transistors”, Tutorial, Symposium of VLSI Technology, June, 2019

- [103] **Sayeef Salahuddin**, “Exploiting new physics for next generation AI”, Huawei Corporation, Shenzhen, April 2019
- [102] **Sayeef Salahuddin**, “Hyperdimensional Computing for One shot learning,” IRDS Workshop, Monterey CA, March 2019
- [101] **Sayeef Salahuddin**, “Negative Capacitance Transistors”, SK Hynix Corporation, Jan 2019
- [100] **Sayeef Salahuddin**, “Negative Capacitance Transistors”, Samsung Corporation, Jan, 2019
- [99] **Sayeef Salahuddin**, “Spin Transfer Torque Memory Devices,” 2018 Symposium of Center for Semiconductor Technology Research, NCTU, Hsinchu, Taiwan, Dec, 2018.
- [98] **Sayeef Salahuddin**, “Spin Transfer Torque Memory: Device Physics and Scaling Trends,” TSMC, Hsinchu, Taiwan, Dec, 2018
- [97] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Apple, Cupertino, Dec, 2018.
- [96] **Sayeef Salahuddin**, “Acoustically Driven Ferromagnetic Resonance Driven Excitation of Vacancy Centers,” Material Research Society (MRS) Fall Meeting, Boston, Dec, 2018.
- [95] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” European MRS Fall meeting, Warsaw, Poland, October, 2018.
- [94] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” UC Davis ECE seminar on The 4th Industrial Revolution: Fusion of Technologies, October, 2018.
- [93] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” IEEE S3S conference, October, 2018.
- [92] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” UC Berkeley Physics Colloquia, Aug, 2018.
- [91] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Electrochemical Society Meeting, Seattle, May, 2018.
- [90] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” VLSI-TSA conference, Hsinchu, Taiwan, April, 2018.
- [89] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Material Science and Engineering, UC Riverside, February, 2018.
- [89] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” SemiCon Korea, Seoul, Korea Feb, 2018.
- [88] **Sayeef Salahuddin**, Short course on Negative Capacitance Transistors, International Electron Devices Meeting (IEDM), Dec, 2017.
- [87] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” The 30th International Microprocesses and Nanotechnology Conference (MNC), JeJu, Korea, Nov, 2017. **[Plenary Talk]**
- [86] **Sayeef Salahuddin**, “Energy Efficient Electronics,” DARPA Microsystems Exploratory Council (MEC) workshop on Reinventing Fabrication, Albany, NY, October, 2017.

- [86] **Sayeef Salahuddin**, “Energy Efficient Computing with Hyperdimensional Vector Space Models,” SISPAD, Kamakura, Japan, September, 2017 [**Plenary Talk**].
- [85] **Sayeef Salahuddin**, “Negative Capacitance FET,” 12th Topical Workshop on Heterostructure Microelectronics, Kirishima, Japan, Aug, 2017.
- [84] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” I-RICE workshop, NCTU, Taiwan, June, 2017.
- [83] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” CTO Distinguished talk, GlobalFoundries, Malta, Albany, 2017.
- [82] **Sayeef Salahuddin**, “Spin Orbit Torque in Ferrimagnetic GdFeCo,” SpinTec, Grenoble, France, June 2017.
- [81] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Semiconductor Interface Specialist’s Conference (SISC), San Diego, December, 2016.
- [80] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” American Vacuum Society Meeting, Connecticut, November, 2016.
- [79] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Electrochemical Society meeting, Hawaii, October, 2016.
- [78] **Sayeef Salahuddin**, “Recent progress on Negative Capacitance Transistors,” Athens workshop on energy efficient Nanoelectronics, Athens, Greece, July, 2016.
- [77] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” Electronic Material Conference, Delaware, June, 2016.
- [76] **Sayeef Salahuddin**, “Energy efficiency in Nanoelectronics,” National Science Foundation, May, 2016.
- [75] **Sayeef Salahuddin**, “Negative Capacitance Transistors,” VLSI-TSA Conference, March, 2016.
- [74] **Sayeef Salahuddin**, “Voltage Control of Magnetization in Natural and Synthetic Multiferroic Heterostructures,” MRS Fall meeting, 2015.
- [73] **Sayeef Salahuddin**, ‘A Physics Quest for Energy Efficiency in Future Computing Technologies’, *EE Distinguished Lecture, Stanford University, 2015*.
- [72] **Sayeef Salahuddin**, ‘Negative Capacitance Transistors’, *Keysight Lecture*, Sonoma State University, 2015.
- [71] **Sayeef Salahuddin**, ‘Negative Capacitance Transistors’, SFSY, Nov, 2015.
- [70] **Sayeef Salahuddin**, ‘Negative Capacitance Transistors’, IWDTF, Tokyo, Japan, Nov, 2015.
- [69] **Sayeef Salahuddin**, ‘Controlled Phase Transition for Next Generation Electronics’, Ringberg Castle, Oct, 2015.

- [68] **Sayeef Salahuddin**, 'Electronics and Optoelectronics with transitional metal dichalcogenides,' IEEE Photonics Workshop, Nassau, Bahamas, July, 2015.
- [67] **Sayeef Salahuddin**, 'Control of Nanomagnets using Spin Orbit Torque,' Design Automation Conference, June, 2015.
- [66] **Sayeef Salahuddin**, 'Control of Nanomagnets using Spin Orbit Torque,' APS March Meeting, March, 2015.
- [65] **Sayeef Salahuddin**, 'Control of Nanomagnets using Spin Orbit Torque,' Samsung Corporation, San Jose, Jan, 2015.
- [64] **Sayeef Salahuddin**, 'Spin Transfer Torque Memory : Device Physics and Technology Prospects,' Lam Research, San Jose, CA, Dec, 2014.
- [63] **Sayeef Salahuddin**, 'Control of Nanomagnets using Spin Orbit Torque,' Condensed Matter Seminar, UC Santa Cruz, Nov, 2014.
- [62] **Sayeef Salahuddin**, 'Control of Nanomagnets using Spin Orbit Torque,' Stanford Memory Workshop, October, 2014.
- [61] **Sayeef Salahuddin**, 'Controlling Magnetization With Spin Orbit Torque,' Global Foundries, San Jose, CA, Sept 2014.
- [60] **Sayeef Salahuddin**, 'Negative Capacitance Transistors', SSDM, Tsukuba, Japan, September, 2014.
- [59] **Sayeef Salahuddin**, 'Negative Capacitance Transistors,' Emerging Research Devices Meeting, New Mexico, August, 2014.
- [58] **Sayeef Salahuddin**, 'Electronics and Optoelectronics with transitional metal dichalcogenides,' Workshop on Beyond Graphene electronics, Army Research Laboratory, Virginia, August, 2014.
- [57] **Sayeef Salahuddin**, 'Control of Nanomagnets using Natural and Synthetic Multiferroics,' Gordon Research Conference, University of New England, Biddeford, ME, August, 2014.
- [56] **Sayeef Salahuddin**, 'Negative Capacitance Transistors,' Silicon Nanoelectronics Workshop, June, 2014.
- [55] **Sayeef Salahuddin**, 'Electronics and Optoelectronics with 2D semiconductors,' International Microwave Symposium, Florida, June 2014.
- [54] **Sayeef Salahuddin**, 'Electronics and Optoelectronics with 2D semiconductors', MRS Spring Meeting, San Francisco, April, 2014.
- [53] **Sayeef Salahuddin**, 'Negative Capacitance Transistors,' MRS Spring Meeting, San Francisco, April, 2014.
- [52] **Sayeef Salahuddin**, 'Electronics and Optoelectronics with 2D semiconductors,' Symposium by IEEE San Francisco Bay area, April, 2014.

- [51] **Sayeeef Salahuddin**, ‘Emerging Materials for Energy Efficient Devices,’ ISQED, San Jose, CA, March, 2014.
- [50] **Sayeeef Salahuddin**, ‘Spin Transfer Torque Memory : Device Physics and Technology Prospects,’ Sandisk Corporation, Milipitas, CA, Feb 2014.
- [49] **Sayeeef Salahuddin**, ‘Emerging Materials for Energy Efficient Electronics,’ SMEE, Hongkong, December 2013. [*Keynote presentation*]
- [48] **Sayeeef Salahuddin**, ‘Emergent Materials for Electronics,’ UCLA, October 2013.
- [47] **Sayeeef Salahuddin**, ‘Electronics and Optoelectronics with 2D material semiconductors, International Workshop on Computational Electronics’, Nara, Japan, August, 2013.
- [46] **Sayeeef Salahuddin**, ”2D semiconductors and their heterostructures,” Conference on Flatlands Beyond Graphene, Jacobs University, Germany, June, 2013.
- [45] **Sayeeef Salahuddin**, ”Electronics with 2D materials,” CECAM Workshop, Bremen, Germany, June, 2013.
- [44] **Sayeeef Salahuddin**, ”Electronics with 2D materials,” International Workshop on Computational Electronics, Nara, Japan, June, 2013.
- [43] **Sayeeef Salahuddin**, “Electric field control of magnetism: experiment and modeling” APS March Meeting, Chicago, January, 2013.
- [42] **Sayeeef Salahuddin**, “How good 2D Materials are for electronics” Workshop on 2D materials, Penn State University, 2013.
- [41] S.Salahuddin, “My personal notes on writing a NSF CAREER proposal,” NSF Invited speaker for CAREER workshop, Temple University, 2013.
- [40] **Sayeeef Salahuddin**, “Electric Field Control of Magnetism,” Magnetism and Magnetic Materials (MMM) conference, Chicago, January, 2013.
- [39] **Sayeeef Salahuddin** “Beyond CMOS technologies,” Advanced Materials Symposium, San Francisco, December, 2012.
- [38] **Sayeeef Salahuddin**, “Negative capacitance in a ferroelectric-dielectric Heterostructure,” SPIE, San Diego, 2012.
- [37] **Sayeeef Salahuddin**, “2D semiconductor devices,” ARO Workshop on 2D Materials, Ohio State University, 2012.
- [36] **Sayeeef Salahuddin**, “Electric field control of magnetism,” ICYMAT, Singapore, 2012 (Keynote).
- [35] **Sayeeef Salahuddin**, “Ferro-FET,” Device Research Conference, Penn State University, 2012 (Tutorial).
- [34] **S.Salahuddin**, “Negative capacitance,” National University of Singapore, 2012.

- [33] **Sayeef Salahuddin**, “Negative/Giant capacitance in a ferroelectric-dielectric heterostructure for ultra low power computing ,” University of Southern Illinois, Carbondale, 2012.
- [32] **Sayeef Salahuddin**, “Giant/Negative capacitance in a ferroelectric/dielectric heterostructure,” Berkeley Nanoforum, 2012.
- [31] **S.Salahuddin**, “Numerical modeling for ultra low energy electronic devices: two examples of equilibrium and non-equilibrium Problems,” Lawrence Berkeley National Laboratory, 2012.
- [30] **Sayeef Salahuddin**, “Ultra low power ferro FET,” Bangladesh University of Engineering and Technology (BUET), 2012.
- [29] **Sayeef Salahuddin**, “Negative capacitance,” Qualcomm, San Diego, 2012.
- [28] **Sayeef Salahuddin**, “Negative/Giant capacitance Gate Stack,” Intel, 2012.
- [27] **Sayeef Salahuddin**, “Negative/Giant Capacitance in a Ferroelectric-Dielectric Heterostructure For Ultra Low Power Computing ,” IWPSD, IIT Kanpur, India, 2011.
- [26] **Sayeef Salahuddin**, “Possibility of piezoelectric-ferromagnet bilayer based microwave resonators and oscillators,” Nano-DDS, 2011.
- [25] Salahuddin, “Simulation of carbon heterostructures as barrier free tunneling transistors ,” EMC, Montreal, Canada, 2011.
- [24] **Sayeef Salahuddin**, “Current and electric field induced switching of ferromagnets for low-power memory applications,” ISQED, San Jose, 2011 (Tutorial).
- [23] **Sayeef Salahuddin**, “Graphene based electronics,” Army Research Laboratory, 2011.
- [22] **Sayeef Salahuddin**, “Giant capacitance in a ferroelectric-dielectric heterostructure,” Stanford University, 2011.
- [21] **Sayeef Salahuddin**, “Multiscale modeling for novel nanoscale devices,” ARO Workshop, Washington, October, 2010.
- [20] **Sayeef Salahuddin**, “Barrier free tunneling in a carbon heterostructure transistor,” Graphene Workshop, SUNY Albany, September 2010.
- [19] **Sayeef Salahuddin**, “Novel concepts for steep slope switches”, SISPAD, Bolgna, Italy, 2010.
- [18] **Sayeef Salahuddin**, “Steep subthreshold transistors for ultra low power electronics,” Tsinghua University, Beijing, China, 2010.
- [17] **Sayeef Salahuddin**, “Quantum transport simulation: A few case studies where it is necessary,” Bridging the gap between theory and experiment: which theoretical approaches are best suited to solve real problems in nanotechnology and biology?, Stanford University, Februray, 2010.
- [16] **Sayeef Salahuddin**, “On the possibility of a negative capacitance transistor,” MRS March meeting., 2010.

- [15] **Sayeeef Salahuddin**, “Spin Torque Transfer devices--perspectives on technology Simulation,” Emerging Technologies in Solid State Devices Workshop, December 5 - 6, 2009.
- [14] **Sayeeef Salahuddin**, “Spin Torque Devices: A technology simulation,” NCCAUS Thin Film Users Group, October 14, 2009.
- [13] **Sayeeef Salahuddin**, “Recent perspectives on spin torque devices”, 6th International Symposium on Advanced Gate Stack Technology, August 2009.
- [12] **Sayeeef Salahuddin**, “Nanomagnetic logic”, DARPA Industry Day on Spin Logic, Jackson Hole, Wyoming, July, 2009.
- [11] **Sayeeef Salahuddin**, “Can subthreshold swing in a classical FET be lowered below 60 mV/decade?”, Special Session on ‘Green Devices’ at “The International Symposium on VLSI Technology, Systems and Applications (2009 VLSI-TSA)”, 2009 .
- [10] **Sayeeef Salahuddin**, “Ferro FET, ” Independent University, Bangladesh, 2010.
- [9] **Sayeeef Salahuddin**, “Negative capacitance from a ferroelectric stack”, Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, June, 2009.
- [8] **Sayeeef Salahuddin**, “Tailoring non equilibrium for low power logic and memory”, Solid State Seminar, University of Notre Dame, Jan 23, 2009.
- [7] **Sayeeef Salahuddin**, “Novel electronic and spintronic Devices for Low Power Computing”, SEMATECH, Austin, TX, September, 2008.
- [6] **Sayeeef Salahuddin**, “Novel electronic and spintronic devices for low power computing”, Nano Seminar series, Berkeley Nanoscience and Nano Engineering Institute, Nov, 7, 2008.
- [5] **Sayeeef Salahuddin**, “Tailoring non equilibrium for low power logic and memory”, EECS seminar, UC Berkeley, August 29, 2008.
- [4] **Sayeeef Salahuddin**, “Novel electronic and spintronic devices for low power switching”, DTC seminar series, University of Minnesota, May 19, 2008.
- [3] **Sayeeef Salahuddin**, “Use of negative capacitance to provide voltage amplification for ultra low power nanoscale devices,” APS March Meeting, 2008.
- [2] **Sayeeef Salahuddin**, “Novel electronic and spintronic devices for low power switching”, IBM Watson Research Center, February, 2008.
- [1] **Sayeeef Salahuddin**, “Interacting systems for low power electronic and spintronic switching,” SRC TECHCON 2007: Technology and Talent for the 21st Century, Sept 11th, Austin, Texas, 2007.

PATENTS

23 patent disclosures through UC. 4 of them have been licensed.

OTHER NON-REFEREED TALKS AND PRESENTATIONS

Salahuddin group regularly presents in the annual March meeting of American Physical Society and Material Research Society’s Spring and Fall Meetings and MMM and Intermag Conferences.