

# Stanford

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## Subhasish Mitra

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### CONTACT INFORMATION

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### Bio

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### ACADEMIC APPOINTMENTS

- Professor, Electrical Engineering
- Professor, Computer Science
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

### PROGRAM AFFILIATIONS

- Stanford SystemX Alliance

### Publications

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### PUBLICATIONS

- **Rethinking Error Injection for Effective Resilience**  
Mirkhani, S., Cho, H., Mitra, S., Abraham, J.  
2014
- **Sensor-to-Digital Interface Built Entirely with Carbon Nanotube FETs** *IEEE Journal on Solid-State Circuits, Special Issue on IEEE Intl. Solid-State Circuits Conf.*  
Shulaker, M., Van Rethy, J., Hills, G., Wei, H., Chen, H., Gielen, G., Mitra, S.  
2014
- **QED Post-Silicon Validation and Debug: Frequently Asked Questions**  
Lin, D., Mitra, S.  
2014
- **System-Level Benchmarking with Yield-Enhanced Standard Cell Library for Carbon Nanotube VLSI Circuits** *ACM Journal on Emerging Technologies in Computing Systems*  
Bobba, S., Zhang, J., Gaillardon, P., E., Wong, H., S.P., Mitra, S., De Micheli, G.  
2014
- **Combinational Logic Design Using Six-Terminal NEM Relays** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*

- Lee, D., Lee, W. S., Chen, C., Fallah, F., Provine, J., Chong, S., Watkins, J., Howe, R. T., Wong, H. P., Mitra, S.  
2013; 32 (5): 653-666
- **Monolithic Three-Dimensional Integration of Carbon Nanotube FET Complementary Logic Circuits**  
Wei, H., Shulaker, M., Wong, H., S.P., Mitra, S.  
2013
  - **Carbon Nanotube Computer** *Nature (Cover Feature)*  
Shulaker, M., Hills, G., Patil, N., Wei, H., Chen, H., Gielen, G., Mitra, S.  
2013; 501 (7468)
  - **Rapid Exploration of Processing and Design Guidelines to Overcome Carbon Nanotube Variations**  
Hills, G., Shulaker, M., Zhang, J., Wong, H., S.P., Mitra, S.  
2013
  - **Self-Repair of Uncore Components in Robust System-on-Chips: An OpenSPARC T2 Case Study**  
Li, Y., Cheng, E., Makar, S., Mitra, S.  
2013
  - **Detection of Early-Life Failures in High-K Metal-Gate Transistors and Ultra Low-K Inter-Metal Dielectrics**  
Kim, Y., M., Seomun, J., Kim, H., O., Do, K., T., Choi, J., Y., Kim, K., S., Mitra, S.  
2013
  - **Sascha: The Stanford Carbon Nanotube Controlled Handshaking Robot**  
Shulaker, M., Van Rethy, J., Hills, G., Chen, H., Gielen, G., Wong, H., S.P., Mitra, S.  
2013
  - **Early-Life Failure Detection using SAT-Based ATPG**  
Sauer, M., Kim, Y., M., Seomun, J., Kim, H., O., Do, K., T., Choi, J., Y., Mitra, S.  
2013
  - **Carbon Nanotube Circuits: Opportunities and Challenges**  
Wei, H., Shulaker, M., Hills, G., Chen, H., Li, C., Liyanage, L., Mitra, S.  
2013
  - **Reliability of Graphene Interconnects and N-type Doping of Carbon Nanotube Transistors**  
Liyanage, L., S., Chen, X., Wei, H., Chen, H., Y., Mitra, S., Wong, H., S.P.  
2013
  - **Underdesigned and Opportunistic Computing** *Keynote paper, IEEE Trans. CAD*  
Gupta, P., Srivastava, M., Agarwal, Y., Swanson, S., Sylvester, D., Kumar, R., Mitra, S.  
2013
  - **Effective Post-Silicon Validation**  
Mitra, S.  
2013
  - **Quantitative Evaluation of Soft Error Injection Techniques for Robust System Design**  
Cho, H., Mirkhani, S., Cher, C., Y., Abraham, J., A., Mitra, S.  
2013
  - **Experimental Demonstration of a Fully Digital Capacitive Sensor Interface Built Entirely using Carbon Nanotube FETs**  
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2013
  - **Overcoming Post-Silicon Validation Challenges through Quick Error Detection (QED)**  
Lin, D., Hong, T., Li, Y., Fallah, F., Gardner, D., S., Hakim, N., Mitra, S.  
2013
  - **Mechanistic and structural insight into the functional dichotomy between IL-2 and IL-15** *NATURE IMMUNOLOGY*  
Ring, A. M., Lin, J., Feng, D., Mitra, S., Rickert, M., Bowman, G. R., Pande, V. S., Li, P., Moraga, I., Spolski, R., Oezkan, E., Leonard, W. J., Garcia, et al

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- **GLIOBLASTOMA CELLS EXPRESSING EGFRVIII ARE MORE SENSITIVE TO CK2 INHIBITION** *17th Annual Scientific Meeting and Education Day of the Society-for-Neuro-Oncology (SNO)*  
Nitta, R., Mitra, S., Bui, T., Li, G.  
OXFORD UNIV PRESS INC.2012: 7–8
- **Expression of epidermal growth factor variant III (EGFRvIII) in pediatric diffuse intrinsic pontine gliomas** *JOURNAL OF NEURO-ONCOLOGY*  
Li, G., Mitra, S. S., Monje, M., Henrich, K. N., Bangs, C. D., Nitta, R. T., Wong, A. J.  
2012; 108 (3): 395-402
- **Flexible Control of Block Copolymer Directed Self-Assembly using Small, Topographical Templates: Potential Lithography Solution for Integrated Circuit Contact Hole Patterning** *ADVANCED MATERIALS*  
Yi, H., Bao, X., Zhang, J., Bencher, C., Chang, L., Chen, X., Tiberio, R., Conway, J., Dai, H., Chen, Y., Mitra, S., Wong, H. P.  
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- **HEDGEHOG PATHWAY INHIBITION ERADICATES THE TUMOR-INITIATING CELL POPULATION IN DIPG, BUT DOES NOT PROLONG SURVIVAL** *15th International Symposium on Pediatric Neuro-Oncology (ISPNO)*  
Monje, M., Freret, M., Mitra, S., Mallick, S., Kim, J., Beachy, P.  
OXFORD UNIV PRESS INC.2012: 28–28
- **The CD47-signal regulatory protein alpha (SIRPa) interaction is a therapeutic target for human solid tumors** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Willingham, S. B., Volkmer, J., Gentles, A. J., Sahoo, D., Dalerba, P., Mitra, S. S., Wang, J., Contreras-Trujillo, H., Martin, R., Cohen, J. D., Lovelace, P., Scheeren, F. A., Chao, et al  
2012; 109 (17): 6662-6667
- **Single-Tube Characterization Methodology for Experimental and Analytical Evaluation of Carbon Nanotube Synthesis** *JAPANESE JOURNAL OF APPLIED PHYSICS*  
Chen, H., Lin, A., Liyanage, L. S., Beasley, C., Patil, N., Wei, H., Mitra, S., Wong, H. P.  
2012; 51 (4)
- **Robust Digital VLSI using Carbon Nanotubes** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
Zhang, J., Lin, A., Patil, N., Wei, H., Wei, L., Wong, H. P., Mitra, S.  
2012; 31 (4): 453-471
- **Control of intra-oesophageal pH in patients with Barrett's oesophagus on omeprazole-sodium bicarbonate therapy** *ALIMENTARY PHARMACOLOGY & THERAPEUTICS*  
Gerson, L. B., Mitra, S., Bleker, W. F., Yeung, P.  
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- **ERSA: Error Resilient System Architecture for Probabilistic Applications** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
Cho, H., Leem, L., Mitra, S.  
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- **Heterogeneous reallocation of presynaptic efficacy in recurrent excitatory circuits adapting to inactivity.** *Nature neuroscience*  
Mitra, A., Mitra, S. S., Tsien, R. W.  
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- **Probabilistic Analysis of Gallager B Faulty Decoder** *IEEE International Conference on Communications (ICC)*  
Yazdi, S. M., Cho, H., Sun, Y., Mitra, S., Dolecek, L.  
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- **Contact-Hole Patterning for Random Logic Circuits using Block Copolymer Directed Self-Assembly**  
Yi, H., Bao, X., Zhang, J., Tiberio, R., Conway, J., Chang, L., Mitra, S.  
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- **Cooling Three-Dimensional Integrated Circuits using Power Delivery Networks**  
Wei, H., Wu, T., Sekar, D., Cronquist, B., Pease, F., Mitra, S.  
2012

- **The Device-to-System Spectrum -- A Tutorial on IC Design with Nanomaterials** *IEEE/ACM Design Automation and Test in Europe*  
Chen, D., Mitra, S., Pop, E., Shanbhag, N.  
2012
- **Nano-Electro-Mechanical Relays for FPGA Routing: Experimental Demonstration and a Design Technique**  
Chen, C., Lee, W., S., Parsa, R., Chong, S., Provine, J., Watt, J., Mitra, S.  
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- **Nano-Electro-Mechanical (NEM) Relays and their Application to FPGA Routing** *17th Asia and South Pacific Design Automation Conference (ASP-DAC)*  
Chen, C., Lee, S., Provine, J., Chong, S., Parsa, R., Lee, D., Howe, R. T., Wong, H. P., Mitra, S.  
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- **Integration of Nanoelectromechanical Relays With Silicon nMOS** *IEEE TRANSACTIONS ON ELECTRON DEVICES*  
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- **Bug Localization Techniques for Effective Post-Silicon Validation** *17th Asia and South Pacific Design Automation Conference (ASP-DAC)*  
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- **Wafer-Scale Fabrication and Characterization of Thin-Film Transistors with Polythiophene-Sorted Semiconducting Carbon Nanotube Networks** *ACS NANO*  
Liyanage, L. S., Lee, H., Patil, N., Park, S., Mitra, S., Bao, Z., Wong, H. P.  
2012; 6 (1): 451-458
- **Contact Hole Patterning for Random Logic Circuits using Block Copolymer Directed Self-Assembly** *Conference on Alternative Lithographic Technologies IV*  
Yi, H., Bao, X., Zhang, J., Tiberio, R., Conway, J., Chang, L., Mitra, S., Wong, H. P.  
SPIE-INT SOC OPTICAL ENGINEERING.2012
- **Directional Limits on Persistent Gravitational Waves Using LIGO S5 Science Data** *PHYSICAL REVIEW LETTERS*  
Abadie, J., Abbott, B. P., Abbott, R., ABERNATHY, M., Accadia, T., Acernese, F., Adams, C., Adhikari, R., Ajith, P., Allen, B., Allen, G. S., Ceron, E. A., Amin, et al  
2011; 107 (27)
- **Planck early results. XXII. The submillimetre properties of a sample of Galactic cold clumps** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **Planck early results. X. Statistical analysis of Sunyaev-Zeldovich scaling relations for X-ray galaxy clusters** *ASTRONOMY & ASTROPHYSICS*  
Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartelmann, M., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **Planck early results. XXIII. The first all-sky survey of Galactic cold clumps** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **Planck early results. I. The Planck mission** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Baker, M., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, et al  
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- **Planck early results. XI. Calibration of the local galaxy cluster Sunyaev-Zeldovich scaling relations** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartelmann, M., Bartlett, J. G., Battaner, E., Benabed, et al

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- **Planck early results. VI. The High Frequency Instrument data processing** *ASTRONOMY & ASTROPHYSICS*  
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- **Planck early results. IX. XMM-Newton follow-up for validation of Planck cluster candidates** *ASTRONOMY & ASTROPHYSICS*  
Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartelmann, M., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **Planck early results. XII. Cluster Sunyaev-Zeldovich optical scaling relations** *ASTRONOMY & ASTROPHYSICS*  
Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartelmann, M., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **Planck early results. XX. New light on anomalous microwave emission from spinning dust grains** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
2011; 536
- **Planck early results. XV. Spectral energy distributions and radio continuum spectra of northern extragalactic radio sources** *ASTRONOMY & ASTROPHYSICS*  
Aatrokoski, J., Ade, P. A., Aghanim, N., Aller, H. D., Aller, M. F., Angelakis, E., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, et al  
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- **Planck early results. XXV. Thermal dust in nearby molecular clouds** *ASTRONOMY & ASTROPHYSICS*  
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- **Planck early results. VIII. The all-sky early Sunyaev-Zeldovich cluster sample** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartelmann, M., Bartlett, J. G., Battaner, E., Batty, et al  
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- **Planck early results. VII. The Early Release Compact Source Catalogue** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
2011; 536
- **Planck early results. XVIII. The power spectrum of cosmic infrared background anisotropies** *ASTRONOMY & ASTROPHYSICS*  
Ade, P. A., Aghanim, N., Arnaud, M., Ashdown, M., Aumont, J., Baccigalupi, C., Balbi, A., Banday, A. J., Barreiro, R. B., Bartlett, J. G., Battaner, E., Benabed, K., Benoit, et al  
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- **TUMOR-ASSOCIATED GLIAL CELLS PROMOTE GROWTH OF GBM XENOGRAFTS IN EGFP NOD/SCID MICE** *16th Annual Scientific Meeting of the Society-for-Neuro-Oncology (SNO)/AANS/CNS Section on Tumors*  
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- **COMPARISON OF DIPG NEUROSPHERE CELL LINES FROM THREE PATIENTS** *16th Annual Scientific Meeting of the Society-for-Neuro-Oncology (SNO)/AANS/CNS Section on Tumors*  
Monje, M., Mitra, S. S., Freret, M. E., Edwards, M. S., Weissman, I. L., Beachy, P. A.  
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- **Salmonella exploits Arl8B-directed kinesin activity to promote endosome tubulation and cell-to-cell transfer** *CELLULAR MICROBIOLOGY*  
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- **Characterization and Design of Logic Circuits in the Presence of Carbon Nanotube Density Variations** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
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- **RNA molecules with conserved catalytic cores but variable peripheries fold along unique energetically optimized pathways** *RNA-A PUBLICATION OF THE RNA SOCIETY*  
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- **The Case for RAMCloud** *COMMUNICATIONS OF THE ACM*  
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- **Scalable Carbon Nanotube Computational and Storage Circuits Immune to Metallic and Mispositioned Carbon Nanotubes** *IEEE TRANSACTIONS ON NANOTECHNOLOGY*  
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- **Search for gravitational waves from binary black hole inspiral, merger, and ringdown** *PHYSICAL REVIEW D*  
Abadie, J., Abbott, B. P., Abbott, R., ABERNATHY, M., Accadia, T., Acernese, F., Adams, C., Adhikari, R., Ajith, P., Allen, B., Allen, G. S., Ceron, E. A., Amin, et al  
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- **Self-Tuning for Maximized Lifetime Energy-Efficiency in the Presence of Circuit Aging** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
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- **Linear Increases in Carbon Nanotube Density Through Multiple Transfer Technique** *NANO LETTERS*  
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- **The effect of amine protonation on the electrical properties of spin-assembled single-walled carbon nanotube networks** *NANOTECHNOLOGY*  
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- **Hedgehog-responsive candidate cell of origin for diffuse intrinsic pontine glioma** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
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- **Search for gravitational waves associated with the August 2006 timing glitch of the Vela pulsar** *PHYSICAL REVIEW D*  
Abadie, J., Abbott, B. P., Abbott, R., Adhikari, R., Ajith, P., Allen, B., Allen, G., Ceron, E. A., Amin, R. S., Anderson, S. B., Anderson, W. G., Arain, M. A., Araya, et al  
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- **Characterization and Implementation of Fault-Tolerant Vertical Links for 3-D Networks-on-Chip** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
Loi, I., Angiolini, F., Fujita, S., Mitra, S., Benini, L.  
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- **Carbon Nanotube Imperfection-Immune Digital VLSI: Frequently Asked Questions Updated**  
Wei, H., Zhang, J., Wei, L., Patil, N., Lin, A., Shulaker, M., Mitra, S.  
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- **Robust System Design** *IPSSJ Trans. System LSI Design Methodology*  
Mitra, S., Cho, H., Hong, T., Kim, Y., Lee, H., Leem, L.

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● **Carbon Electronics – From Material Synthesis to Circuit Demonstration**

Chen, H., Patil, N., Lin, A., Wei, L., Beasley, C., Zhang, J., Mitra, S.

2011

● **Overcoming CMOS Reliability Challenges: From Devices to Circuits and Systems** *IEEE/ACM Design Automation and Test in Europe*

Cao, Y., Gielen, G., Mitra, S., Nassif, S.

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● **Robust System Design to Overcome CMOS Reliability Challenges** *IEEE Journal on Emerging and Selected Topics in Circuits and Systems, Special Issue on the IEEE CAS Forum on Emerging and Selected Topics*

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● **Carbon Nanotube Electronics – Materials, Devices, Circuits, Design, Modeling, and Performance Projection**

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● **Overcoming Carbon Nanotube Variations through Co-optimized Technology and Circuit Design** *IEEE International Electron Devices Meeting (IEDM)*

Zhang, J., Patil, N., Wong, H. P., Mitra, S.

IEEE.2011

● **Air-Stable Technique for Fabricating n-Type Carbon Nanotube FETs** *IEEE International Electron Devices Meeting (IEDM)*

Wei, H., Chen, H., Liyanage, L., Wong, H. P., Mitra, S.

IEEE.2011

● **The role of the c-Jun N-terminal kinase 2-alpha-isoform in non-small cell lung carcinoma tumorigenesis** *ONCOGENE*

Nitta, R. T., Del Vecchio, C. A., Chu, A. H., Mitra, S. S., Godwin, A. K., Wong, A. J.

2011; 30 (2): 234-244

● **Carbon Nanotube Imperfection-Immune Digital VLSI: Frequently Asked Questions Updated Invited Paper** *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*

Wei, H., Zhang, J., Wei, L., Patil, N., Lin, A., Shulaker, M. M., Chen, H., Wong, H. P., Mitra, S.

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● **Integration of Nanoelectromechanical (NEM) Relays with Silicon CMOS with Functional CMOS-NEM Circuit** *IEEE International Electron Devices Meeting (IEDM)*

Chong, S., Lee, B., Parizi, K. B., Provine, J., Mitra, S., Howe, R. T., Wong, H. P.

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● **Carbon Nanotube Electronics - Materials, Devices, Circuits, Design, Modeling, and Performance Projection** *IEEE International Electron Devices Meeting (IEDM)*

Wong, H. P., Mitra, S., Akinwande, D., Beasley, C., Chai, Y., Chen, H., Chen, X., Close, G., Deng, J., Hazeghi, A., Liang, J., Lin, A., Liyanage, et al

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● **Calibration of the LIGO gravitational wave detectors in the fifth science run** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*

Abadie, J., Abbott, B. P., Abbott, R., ABERNATHY, M., Adams, C., Adhikari, R., Ajith, P., Allen, B., Allen, G., Ceron, E. A., Amin, R. S., Anderson, S. B., Anderson, et al

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● **IDENTIFICATION AND TARGETING OF GLIOBLASTOMA STEM CELLS USING EGFRVIII** *Advances in Inflammatory Bowel Diseases Crohn's and Colitis Foundations National Clinical and Research Conference*

Wong, A. J., Del Vecchio, C., Mitra, S., Han, S., Holgado-Madruga, M., Gupta, P.

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