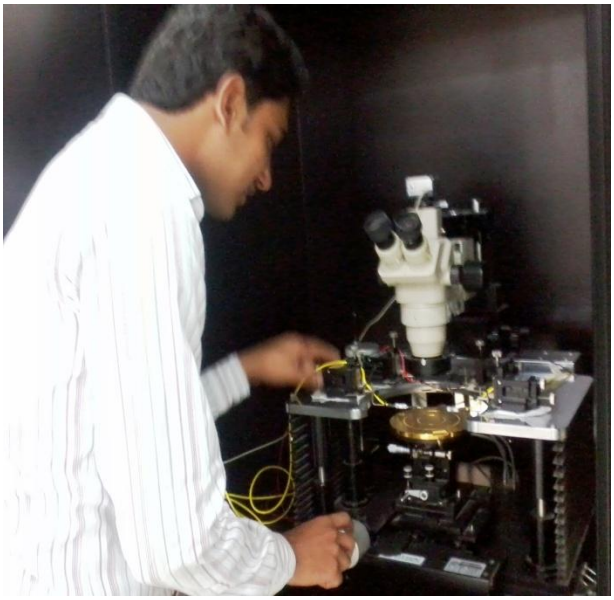
Electronics Design Center



Electronics Design Center performs cutting-edge fundamental and commercially driven research in electronic devices and circuits, radio frequency and microwave integrated circuits. Since its inception (January 2011), EDC's primary objectives have been to investigate scientific fundamentals necessary to obtain incessant improvements in ultimate miniaturization, increased functionality, enhanced bandwidth and improved efficiency. EDC strives to enhance NED University's reputation for quality research output

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People

IT Chair Professor

Dr. Qamar-ul-Wahab

PhD Research Scholars

Sadia Muniza Faraz
Hashim Raza Khan
Sana Arshad

Research Assistants

Abdul Raheem Qureshi
Faiza Zafar

Lab Engineer

Sana Siddiqui

Facilities

- Vector Network Analyzer (R&S®ZVB8)
- Signal Generators (TGA1240 and TGR2050)
- Spectrum Analyzer (Agilent E4408B-BAS ESA-L)
- Probe Station
- Keithley 4200-SCS
- Software:

✓Cadence (IC Design)
✓Mentor Graphics (IC Design)
✓MicroTech (TCAD)
✓Sonnet (EM Simulation)

R&S ZVB8

Agilent E4408B-BAS ESA-L

Keithley 4200-SCS

Probe Station

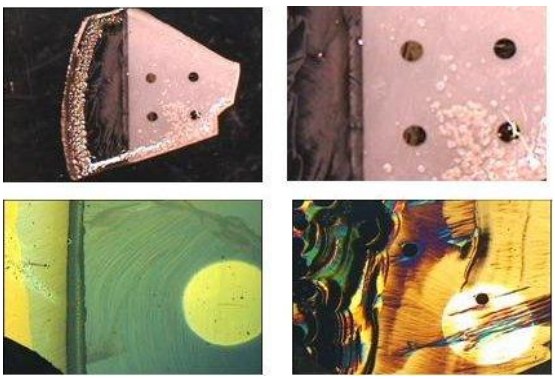
TGR2050 and TGA1240

Projects

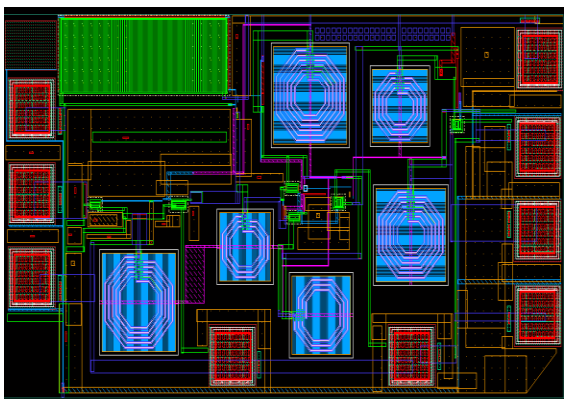
•**Low Noise Amplifiers for RF Applications**- Research is being conducted to improve various LNA parameters such as gain, NF, P1dB, IIP3, power consumption etc. One design has already been taped out to MOSIS for implementation in IBM 0.13µm CMOS Technology.

•**High Efficiency Power Amplifiers for RF Applications** -Research involves designing of frequency selective and power adaptive wideband amplifiers. After successful simulation results, one design has already been fabricated while second design has been taped out to MOSIS for implementation in IBM 0.13µm CMOS Technology.

•**Wide Bandgap Semiconductor Based Electronic and Photonic Devices** - Research includes designing and optimization of wide bandgap semiconductor devices with special focus on the behavior of different parts of devices. This includes structural growth and processing limitations, structure optimization of LEDs (for higher efficiency), the study of defects and other parasitics.



Free Standing GaN Shottky Diode



Layout Design of an LNA

Recent Publications

- "A Fully Integrated Class-E Power Amplifier in 0.13µm CMOS Technology", **H. R. Khan, A. R. Qureshi,** and **Q. Wahab,** *9th IEEE International NEWCAS Conference*, France, June 2011
- "Post fabrication annealing effects on electrical and optical properties of n-ZnO nanorods/p-Si heterojunction diodes", **S. M. Faraz**, N. H. Alvi, A.Henry, O. Nur, M.Willander and **Q. Wahab**, *Nanotech 2011 Conference,* USA, June 2011
- "A 24 GHz Class-A Power Amplifier in 0.13µm CMOS Technology", **H. R. Khan** and **Q. Wahab**, *International Conference on Solid State and Integrated Circuits*, Shanghai, March 2011
- "Effect of annealing on electrical and optical properties of n-ZnO/p-Si heterojunction diodes", **S.M.Faraz,,** et al. *Innovative Materials and Applications*, Beruit, Lebanon, March 2011
- "Depth-resolved cathodoluminescence study of zinc oxide nanorods catalytically grown on p-type 4H-SiC", N. Bano, I. Hussain, O. Nour, M. Willander, **Q. Wahab** et al. *Journal of Luminescence,* 2010
- "Influence of background concentration induced field on the emission rate signatures of an electron trap in zinc oxide Schottky devices", H. Noor, P. Klason, **S. M. Faraz**, O. Nour, **Q. Wahab,** et al. *Journal of Applied Physics,* 2010.
- "Comparison of Two GaN Transistor Technologies in Broadband Power Amplifiers", S. Azam, C. Svensson, **Q. Wahab** et al. *Microwave Journal,* 2010
- "A TCAD approach for non-linear evaluation of microwave power transistor and its experimental verification by LDMOS", A. Kashif, C. Svensson, K. Hayat, S. Azam, N. Akhter, M. Imran and **Q. Wahab**, *Journal of Computational Electronics*, 2010

Book Chapters

- "GaN and SiC Based High Frequency Power Amplifiers", S.Azam & **Q. Wahab,** Micro and Nano-Electronics and Photonics, New Delhi; Daya Publishing House,2009, pp. 1-19.
- "High Temperature Electronic Materials", **Q. Wahab,** Springer Handbook of Electronic and Photonic materials, Springer, 2007, pp. 537-563. ISBN-10: 0-387-226059-5
- "The present and future trends in High Power Microwave and Millimeter Wave Technologies", S. Azam and **Q. Wahab,** Advanced Microwave and Milimeter Wave Technologies Semiconductor Devices Circuits and Systems, Moumita Mukherjee (Ed.), INTECH PUB, Vienna-Austria, pp.1-12. ISBN: 978-953-307-031-5

Review Articles, Invited Talks & Papers

- "New materials for micro-scale sensors and actuators", **Q. Wahab,** *Materials Science and Engineering* R, 56 (2007) P.1-129
- "Silicon carbide and diamond for high temperature device applications", M. Willande, M. Friesel, **Q. Wahab** and B. Straumal, *Journal of Materials Science: Materials in Electronics*, Volume 17, No.1(2006)
- "RF output power analysis of SiC MESFET using large signal time domain simulations", Q. Wahab, et al. *11th Workshop on Physics and Technology of Semiconductor Devices*, Norsha Publishing House, New-Delhi, p.690 (2001)