

Invited

"Inkjet-Printed Nanotechnology-enabled RFID, Internet of Things and "Zero-Power" Wireless Nodes"

Manos M. Tentzeris

School of ECE

Georgia Tech

Atlanta, GA 30332-250

Prof. Manos M. Tentzeris <etentze@ece.gatech.edu>

Nanotechnology and Inkjet-printed flexible electronics and sensors fabricated on paper, plastic and other polymer substrates are introduced as a sustainable ultra-low-cost solution for the first paradigms of Internet of Things, "Smart Skins" and "Zero-Power" applications. The talk will cover examples from UHF up to the millimeter-wave frequency ranges (mmID's), while it will include the state of the art of fully-integrated wireless sensor modules on paper or flexible polymers and show the first ever 2D sensor integration with an RFID tag module on paper, as well as numerous 3D multilayer paper-based and LCP-based RF/microwave structures, that could potentially set the foundation for the truly convergent wireless sensor ad-hoc networks of the future with enhanced cognitive intelligence and "zero-power" operability through ambient energy harvesting and wireless power transfer. Examples from wearable (e.g. biomonitoring) antennas and RF modules will be reported, as well as the first integration of inkjet-printed nanotechnology-based sensors on paper and organic substrates. The talk will also present challenges for inkjet-printed high-complexity modules as well as future directions in the area of environmentally-friendly ("green") RF electronics and "smart-house" conformal sensors. Special attention will be paid to the latest inkjet-printing advances in multimaterial/multilayer fabrication of components (e.g. capacitors, antenna arrays) with operability up to sub-THz frequency range.

[1] J.Honea, J. Kang, "High-Speed GaN Switches for Motor Drives", Power Electronics Europe, 3 (2012) 38-41.

[2] S.Chowdhury and U.K Mishra, Lateral and Vertical transistors using the AlGaIn/GaN heterostructure IEEE Transaction on Electron Devices, Volume 60, Issue 10, (7 pages)

[3] S. Chowdhury, B.L.Swenson, M.Wong and U K Mishra, Current status and scope of gallium nitride-based vertical transistors for high-power electronics application" Semiconductor Science and Technology Volume 28 Number 7 07401(8pages)