ATHENA Group – Prof. Manos Tentzeris
www.athena.gatech.edu

The ATHENA group at Georgia Tech explores the development of novel technologies for the next generation of wireless RF and mm-wave applications in telecom, defense, space, automotive, and sensing areas through robust low-cost additive manufacturing methods.

**Low-cost Nanomaterial-Enabled Sensors and Switches**
- Selectively functionalized CNT/graphene-based gas sensors for real-time environment monitoring (image above)
- CNT-based RF switches for flexible, fully-printed phased arrays

**Printed “Smart” 3D Wireless Packaging**
- 3D ramped interconnects for application-specific wireless packages (image above)
- Mm-wave system-in-package solutions with antenna array integration and microfluidic-based thermal management

**Reconfigurable 4D Origami-Inspired Structures**
- Tunable frequency selective surfaces using 3D miura folding with paper (image above)
- Compressible/stretchable 3D antennas with liquid metal conductors and 3D scaffolding
- Unique wideband mathematically-inspired 3D fractal-based antennas

**Long-Range RFID and Energy Harvesting**
- Km-range passive “smart-skin” RFID sensors with mm-wave reflectarray (image above)
- Wearable UHF energy harvesting systems for wireless-body IoT devices
- Heterogeneous power scavenging through wireless, solar, and piezo integration

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