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Materials and Production Technologies

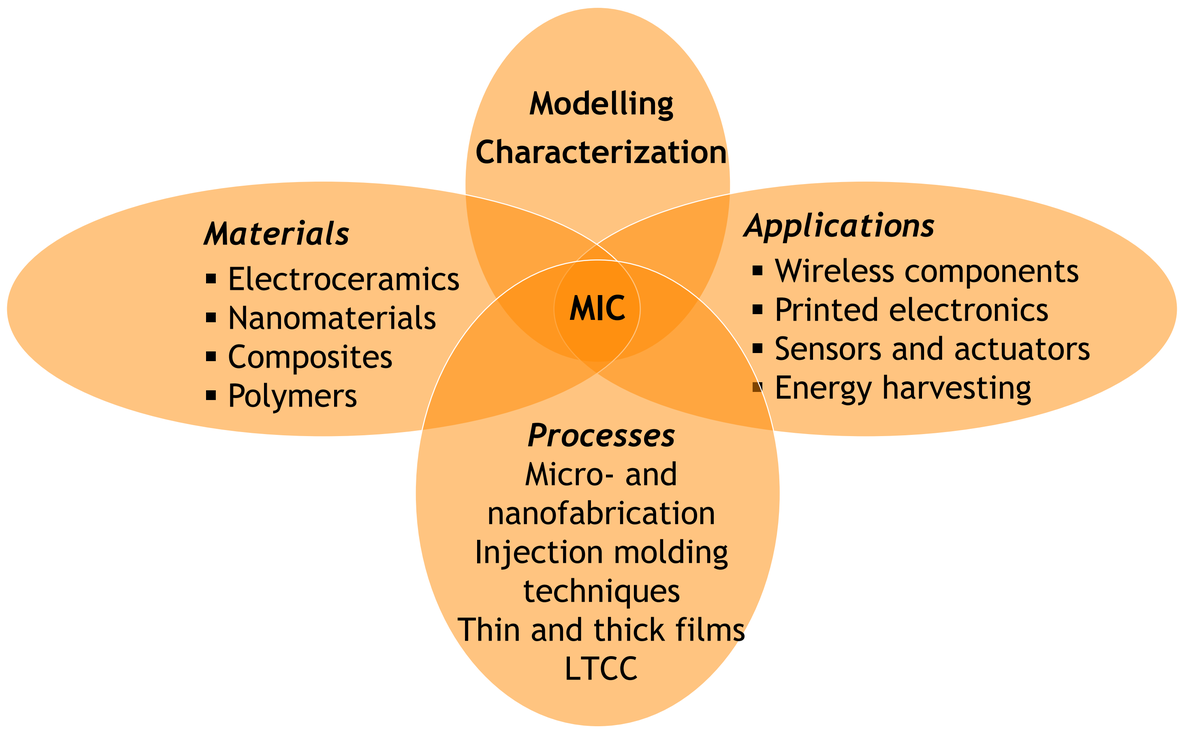
Sami Myllymäki and Mikko Kokkonen

Microelectronics Research Unit, University of Oulu, 6G Flagship

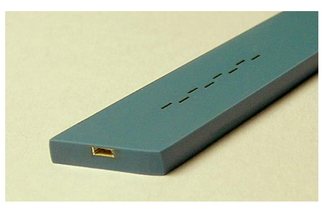
P.O.Box 4500, 90014-Oulu, Finland

sami.myllymaki@oulu.fi

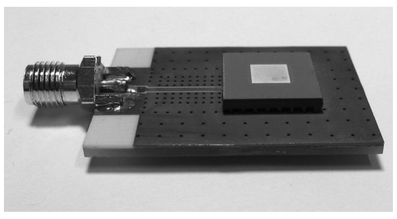
Microelectronics Research Unit (MIC) applies multidisciplinary research for 6G electronics:



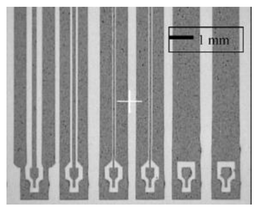
Previous work in the field:



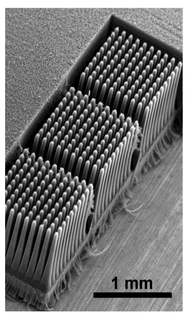
Integrated air-filled waveguide antennas in LTCC for G-band operation 150 GHz (2008)



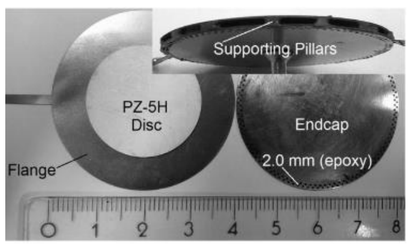
Compact surface-mountable LTCC-BGA antenna package for X-band applications 15 GHz (2008)



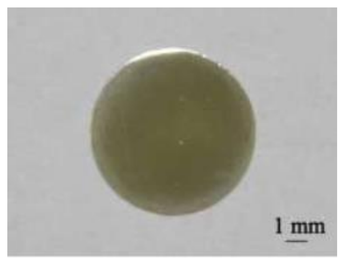
Transmission lines for mmWave characterization in printed electronics



Chip cooling with integrated carbon nanotube microfin architectures (2007)

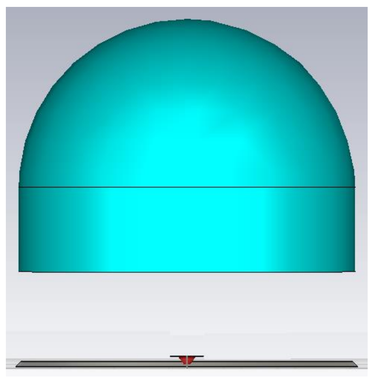


Novel genetically optimised high displacement piezoelectric actuator with efficient use of active material (2017)

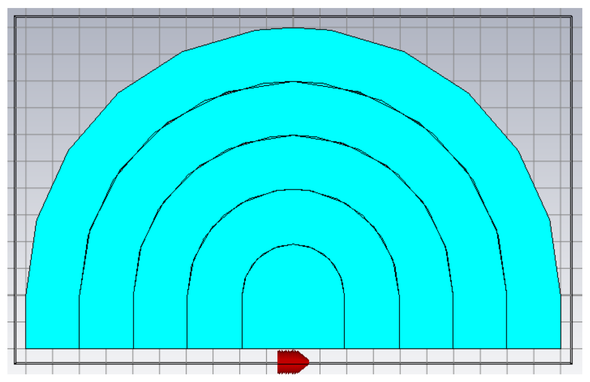


An ABO3-type perovskite provides multisource energy harvesting solar, thermal, and kinetic energies into electricity in a single material (2017)

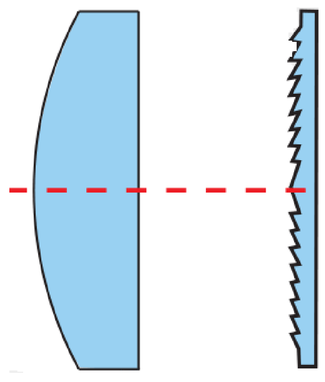
Composite Lens Research for 6G radio telecommunications



All possible lens types such as extended hemispherical lenses are under research. Directivity, gain, beam angular width, frequency bandwidth, scan loss and sideslope attenuation are characterizing lens electrical operations.



Lens structures can be built with several layers with adjusted dielectric properties for Luneburg lenses or anti-reflecting surfaces. Manufactured to 2D sheets and thermal formed to 3D objects, or injection molded by several steps



Lens structure form adjustments for surfaces, such as modification from conventional spherical plano-convex lens (left) to spherical Fresnel lens (right).

Materials' dielectric properties can be adjusted from 1 to 10 according to antenna design, and dielectric loss is minimized.

Manufacturing is optimized for one or multi-material lenses with hybrid manufacturing methods combining conventional lithography techniques, molding techniques, 3D printing techniques and laser processing.

Sub-THz module fabrication is for assuring convenient assembly of antenna chip and lenses into one electronic package.

Sub-THz measurement (CF) setup is being used for lens antenna research.

References

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