



# A New Artificial Dielectric Metamaterial and its Application as a THz Anti-Reflection Coating

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We describe a novel artificial dielectric material which has applications at millimetre and submillimetre wavelengths. The material is manufactured from layers of metal mesh patterned onto thin polypropylene sheets which are then bonded together using a hot pressing process to provide planar rugged discs which can be reliably cycled to cryogenic temperatures. The refractive index of this material can be tuned by adjusting the geometry and spacing of the metal-mesh layers. We demonstrate its usage by designing and characterising a broadband anti-reflection coating for a Z-cut crystalline Quartz plate. The coating was fabricated and applied to the quartz using the hot press technique and characterized using a Fourier Transform Spectrometer. The performance is shown to be in good agreement with HFSS and transmission line modelling results.

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