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Complex Oxide Thin Film Metamaterial Structures for THz applications D. SHREIBER, U.S. Army Research Laboratory, R. CRAVEY, NASA Langley Research Center, M.W. COLE, U.S. Army Research Laboratory — Metamaterials operating in the frequency range of 0.1-1.5 THz are of a special interest for multiple Army applications such as communications, NDE of materials, and detection of chem./bio hazards. Recently proposed dielectric metamaterials present an intriguing venue for the developments in this field due to their low propagation losses and ease of fabrication. These dielectric metamaterials were implemented in bulk and in thick films. Tunability of ferroelectric complex oxides is achieved by applied bias voltage and constitutes an additional benefit for multiple applications. However, real-life applications require usage of relatively low bias voltage which is achievable only by using a ferroelectric complex oxide thin-film. Although the physical dimensions of the thin film metamaterial structures suggest their usage in IR-optical spectrum, their very high dielectric constant provides a rare opportunity to lower their resonant frequency to the frequency range of interest. This presentation will discuss the opportunities and challenges associated with the metamaterial complex oxide thin film structures including numerical investigations of the resonant frequency shift as a function of the complex oxide thin film dielectric constant and thickness.

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