Abstract Submitted
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Transformation optics devices based on tapered waveguides[1] WILLIAM ZIMMERMAN, CHRISTOPHER JENSEN, DAVID LAHNEMAN, TODD ADAMS, THOMAS GRESOCK, KATHRYN ZANDER, VERA SMOLYANINOVA, Towson Univ, IGOR SMOLYANINOVA, University of Maryland — Transformation optics (TO) gives rise to numerous unusual optical devices, such as novel metamaterial lenses and invisibility cloaks. However, it is very difficult to create metamaterials with low-loss broadband performance, especially in the visible frequency range. In our TO devices we use metal/dielectric waveguides to emulate metamaterial properties [1]. Here we report the first experimental realization of TO Luneburg lens waveguides and other novel TO devices [2]. The individual Luneburg lenses in the fabricated waveguides are based on lithographically defined metal/dielectric waveguides. We have studied wavelength and polarization dependent performance of the waveguides. Adiabatic variations of the waveguide shape enable control of the effective refractive index experienced by the TM light propagating inside the waveguide. Our experimental designs appear to be broadband, which has been verified in the 480-633 nm range. These novel optical devices considerably extend our ability to control light on sub-micrometer scales. [1]. V.N. Smolyaninova, et al., Phys. Rev. B 87, 075406 (2013); [2]. V.N. Smolyaninova, et al., Photonics 2, 440 (2015).

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William Zimmerman
Towson Univ

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