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Spatial gradient tuning in metamaterials TOM DRISCOLL, Duke, UCSD, MICHAEL GOLDFLAM, UCSD, NAN JOKERST, Duke, DIMITRI BASOV, UCSD, DAVID SMITH, Duke — Gradient Index (GRIN) metamaterials have been used to create devices inspired by, but often surpassing the potential of, conventional GRIN optics. The unit-cell nature of metamaterials presents the opportunity to exert much greater control over spatial gradients than is possible in natural materials. This is true not only during the design phase but also offers the potential for real-time reconfiguration of the metamaterial gradient. This ability fits nicely into the picture of transformation-optics, in which spatial gradients can enable an impressive suite of innovative devices. We discuss methods to exert control over metamaterial response, focusing on our recent demonstrations using Vanadium Dioxide. We give special attention to role of memristance and mem-capacitance observed in Vanadium Dioxide, which simplify the demands of stimuli and addressing, as well as intersecting metamaterials with the field of memory-materials.

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