Abstract Submitted
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A new mechanism for negative refraction and focusing using selective diffraction from surface corrugation[1] W. T. LU, Y. J. HUANG, P. VODO, R. K. BANYAL, C. H. PERRY, S. SRIDHAR, Electronic Materials Research Institute and Department of Physics, Northeastern University — Refraction at a smooth interface is accompanied by momentum transfer normal to the interface. We show that corrugating an initially smooth, totally reflecting, non-metallic interface provides a momentum kick parallel to the surface, which can be used to refract light negatively or positively. This new mechanism of negative refraction is demonstrated by visible light and microwave experiments on grisms (grating-prisms), and is used to create a new optical device, a grating lens. A plano-concave grating lens is demonstrated that focuses plane microwaves to a point image. Single-beam all-angle-negative-refraction is achieved by incorporating a surface grating on a flat multilayered material. These results show that customized surface engineering can be used to achieve negative refraction even though the bulk material has positive refractive index. The surface periodicity provides a tunable parameter to control beam propagation leading to novel optical and microwave devices.

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