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标题: 3D THz metamaterials from micro/nanomanufacturing
作者: Moser, HO (Moser, Herbert O.); Rockstuhl, C (Rockstuhl, Carsten)
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摘要: Metamaterials are engineered composite materials offering unprecedented control of wave propagation. Despite their complexity, effective properties can frequently be extracted by conceptualizing them as homogeneous and isotropic media with dispersive electric permittivity and magnetic permeability. For an ideal isotropic medium, strong dispersion in these properties causes wave and field vectors to form a left-handed (E,H,k)-frame involving backward waves, and offering control of quantities like the refractive index which may become negative. Experimental evidence exists from microwaves to the visible. Applications include sub-wavelength-resolution imaging, invisibility cloaking, plasmonics-based lasers, metananocircuits, and omnidirectional absorbers. As the engineered sub-structures must be smaller than their design wavelength, micro/nanomanufacturing is exploited from primary pattern generation over lithography to templating and molecular beam epitaxy. 3D metamaterials have been made by stacking of layers, multilayer structuring, and 3D primary pattern generation. Theory shows that full properties may build up over one or a very few layers.
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地址: [Moser, Herbert O.] KIT, Network Excellent Retired Scientists NES, D-76021 Karlsruhe, Germany
[Moser, Herbert O.] IMT, D-76021 Karlsruhe, Germany
[Rockstuhl, Carsten] Univ Jena, Inst Condensed Matter Theory & Solid State Opt, D-07743 Jena, Germany
通讯作者地址: Moser, HO (通讯作者),KIT, Network Excellent Retired Scientists NES, Postfach 3640, D-76021 Karlsruhe, Germany
电子邮件地址: Herbert.O.Moser@web.de
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