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Research on Crystalline Metamaterials

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Message from the Guest Editors

High-power microwaves (HPMs), or directed energy RF, represent an evolution of vacuum electron devices (VEDs) that seek to generate the highest peak power levels in the frequency range of 100 MHz to 100 GHz (and even higher frequencies) in short pulses (10–100 s ns in duration) that can be repetitively pulsed. In 1967, Veselago theoretically investigated exotic electromagnetic properties of metamaterials (MTMs) such as negative refractive index, reversed Doppler effect, and reversed Cherenkov radiation (RCR) in an assumed homogeneous isotropic material in which the real parts of the permittivity and the permeability were both negative. The permittivity ($\varepsilon_{eff}(\omega)$) and the permeability ($\mu_{eff}(\omega)$) are the complex averaged EM response functions of the molecules that make up the material due to the interaction with the electric and magnetic components of an incident wave. The construction of new devices involves designing the EM properties and structures of available materials to obtain the permittivity ($\varepsilon_{eff}(\omega)$) and the permeability ($\mu_{eff}(\omega)$); thus, engineers are able to precision engineer geometries from these materials.

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Message from the Editor-in-Chief

Welcome to *Crystals*, the journal dedicated to the fascinating world of crystallographic research! Crystals are more than mere decorative elements; they hold the key to understanding the fundamental structure of matter. Our mission is to explore the crucial significance of this research across various fields. From medicine to technology, chemistry to geology, crystals play a vital role. Their structure provides insights into new advanced materials, innovative drugs, and groundbreaking technologies. Through *Crystals*, we delve into the microscopic world to discover solutions that will shape the future. Join us on a journey through the *Crystals*, where science merges with beauty and innovation.

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