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Physics and Applications of Epsilon-Near-Zero Materials

Guest Editor:

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Message from the Guest Editor

Materials exhibiting very small dielectric permittivity, or epsilon-near-zero (ENZ) materials, belong to the family of media able to affect electromagnetic radiation in a very unconventional way because the medium effective wavelength is much larger than the vacuum wavelength so that they host a regime where both field amplitude and phase are slowly-varying over relatively large portions of the bulk. Such a key feature allows the electromagnetic field to be manipulated down to its finest details, and it can be put to work to achieve a number of different functionalities.

Other interesting phenomena arise when the ENZ regime is combined with matter nonlinearity since their crucial interplay allows the all-optical transition from dielectric to metal behavior of the medium. Furthermore, such interplay benefits from the nonresonant enhancement of the normal electric field component across the vacuum–ENZ medium interface, producing intriguing effects like transmissivity directional hysteresis.

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Message from the Editor-in-Chief

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