Special Issue

Physics and Applications of Epsilon-Near-Zero Materials

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.

Guest Editor

Dr. Alessandro Ciattoni

CNR - SPIN, Superconducting and other Innovative materials and devices institute, L`Aquila, Coppito, Italy

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Materials
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
materials@mdpi.com

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Editor-in-Chief

Prof. Dr. Maryam Tabrizian
1. Department of Biomedical Engineering, Faculty of Medicine and Health Sciences, McGill University, Montreal, QC H3A 2B6, Canada
2. Faculty of Dentistry and Oral Health Sciences, McGill University, 3640 Rue University, Montreal, QC H3A 0C7, Canada

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