Metamaterials and metasurfaces for advanced electromagnetic wave control

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ABSTRACT

Metamaterials (MMs, i.e. artificially structured materials with novel electromagnetic properties), and their two-dimensional analog, metasurfaces (MSs), have attracted in recent years an enormous degree of attention. This is due to their unique abilities in the control of electromagnetic waves, being able to form components that can tailor the wave amplitude, phase, polarization, velocity, and propagation direction with great flexibility, through ultra-small/light/thin components. Moreover, MMS and MSs can tailor the local fields in their vicinity, being thus able to highly affect all applications that are influenced by local electromagnetic energy density, such as sensing, detection and energy harvesting.

In this poster we will present some of the contributions of the “Photonic-, Phononic- and Meta-Materials group” to recent advancements in the area of metamaterials and metasurfaces. These include: (a) Software-defined reconfigurable metasurfaces for wavefront control (collaboration IESL-ICS) [1] and their impact in applications like wireless communications and virtual reality (Synergy grant WISAR); (b) Chiral metamaterials and metasurfaces for polarization control [2], and circular polarization lasing; (c) Graphene-based metamaterials for dynamic wave modulation [3]; (e) Metasurfaces for cooling and enhancing the efficiency of photovoltaics. All these contributions, besides their individual scientific and technological value, are excellent demonstrations of both the rich physics and the broad applications perspectives of metamaterials and metasurfaces.

REFERENCES

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