Disorder as a degree of freedom for photonic nanomaterials

Rémi CARMINATI
(1) Institut Langevin, ESPCI Paris, PSL University, CNRS, Paris, France
(2) Institut d'Optique Graduate School, Paris-Saclay University, France
remi.carminati@espci.psl.eu

Abstract

Disordered materials structured on scales ranging from tens of nanometers to micrometers scatter light, which is at first sight a disadvantage. However, scattering is also an effective way of modulating light-matter interaction. In particular, being able to control the level of disorder offers a powerful degree of freedom to tune the level of absorption [1], create structural coloration or transparency [2,3], to cite a few examples.
In fact, the possibility of engineering disorder, by creating materials halfway between amorphous systems and photonic crystals, is a subject of growing interest, as will be illustrated in the talk [4].
Another interesting feature is that strongly scattering non-linear materials (powders) can exhibit an efficient response, for example in terms of generation of harmonics. We will analyze the mechanism for preserving the efficiency in the case of second harmonic generation [5].

References

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