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Biography

Kevin Vynck is a CNRS Researcher at the Institut Lumière Matière (iLM) in Lyon, specialized in the theoretical and numerical modelling of light scattering by complex nanostructures. He received his PhD from the University of Montpellier in November 2008, and was post-doctoral fellow at LENS in Florence (Italy) and at the Institut Langevin in Paris. Between 2013 and 2021, he was CNRS researcher at the Laboratoire Photonique, Numérique et Nanosciences (LP2N) in Bordeaux. With his colleagues, he was amongst the firsts to propose using resonant silicon nanostructures for metamaterial applications, to exploit correlated disorder in planar photonic structures for light trapping in thin films, and to investigate the potential of disordered metasurfaces for visual appearance design. In 2019, he was awarded the CNRS Bronze Medal.

Predicting and designing the visual appearance of macroscopic nanostructured surfaces

Nature offers us beautiful visual appearances. The most resplendent of them, from the iridescence of opals and the wings of some butterflies to the bright colors of some birds and fruits, are mostly due to interference effects created by nanostructures. These last decades have witnessed the emergence of new research themes aiming at understanding the microscopic origin of visual effects produced in nature, at reproducing these effects by artificially structuring matter, and at creating new ones- without equivalents in the natural state- for new applications in visual arts.

Research in nanophotonics has mainly focused so far on creating a broad palette of structural colors, as illustrated by many successful reproductions of famous photographies and paintings at the millimeter scale [1]. Our perception of macroscopic objects however strongly depends on attributes other than color, such as gloss, haze and translucency, as well as object shape and lighting environment [2].

In this talk, I will show how concepts and techniques in nanophotonics, mesoscopic wave physics and computer graphics can be combined to predict and design the visual appearance of macroscopic nanostructured surfaces in realistic settings [3]. We will see how certain nano and mesoscale features, such as layered substrates and correlated disorder, translate into distinct, impressive visual effects at the macroscale.

Keywords:

Structural colors; Visual appearance; Waves in complex media; Computer graphics

References

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