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Frequency conversion in two-dimensional photonic structure

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STELLINGEN

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Frequency conversion in two-dimensional photonic structures

I

The transfer of a photonic structure to a gel substrate can improve the visibility of a resonance.

Chapter 4 of this thesis.

II

Decoherence and/or dephasing always lead to a complex q parameter in a Fano resonance. The inverse statement is not true.

Chapter 5 of this thesis.

III

When both the fundamental and the second harmonic fields are resonant with leaky modes of a photonic crystal slab, the efficiency as well as the angular spread of the second harmonic signal are limited by the quality factor of the resonance at the fundamental frequency.

Chapter 6 of this thesis.

IV

A relatively simple physical model based on experimentally accessible parameters gives more insight into the measured second harmonic signal generated in a photonic crystal slab than a full numerical calculation that assumes parameters of an ideal structure.

Chapter 6 of this thesis.

V

Classification of insects with structural color should be based on the measured angle-dependent reflection spectra rather than on subjective perception of color by a human observer as is common in entomology.

Gold bugs and beyond: a review of iridescence and structural colour mechanisms in beetles (Coleoptera), A. E. Seago, P. Brady, J.-P. Vigneron, and T. D. Schultz, J. R. Soc. Interface 6, S165-S184 (2009).

VI

Mimicking natural photonic structures to solve a specific technological problem may be more efficient than independently trying to come up with the same solution which has existed in nature for millions of years.

Mimicking the colourful wing scale structure of the Papilio blumei butterfly, M. Kolle, P. M. Salgard-Cunha, M. R. J. Scherer, F. Huang, P. Vukusic, S. Mahajan, J. J. Baumberg, and U. Steiner, Nature Nanotechnology 5, 511-515 (2010).

VII

It is often overlooked that a device that hides an object but itself is visible is not a true cloak.

Macroscopic Invisibility Cloak for Visible Light, B. Zhang, Y. Luo, X. Liu, and G. Barbastathis, Phys. Rev. Lett. 106, 033901 (2011).

VIII

Scientists should be given the benefit of the doubt regarding the relevance of their research for mankind. Although “encouraged” to stop working on semiconductors on several occasions, Russell Ohl continued his research to discover both the p-n junction and the photovoltaic effect in this device in 1940.

The origins of the pn junction, M. Riordan and L. Hoddeson, IEEE Spectrum 34(6), 46-51 (1997).

Interview of Dr. R. Ohl by L. H. Hoddeson on August 19, 1976, Niels Bohr Library and Archives, American Institute of Physics, College Park, MD USA, http://www.aip.org/history/ohilist/4804_1.html.

IX

Enjoying simple things in life is far from simple.

X

Tolerance is like a tree. It can be planted by one’s parents and nurtured by society, but it is each person’s responsibility to water it every day for it to grow healthy and strong.

Ljubiša Babić
Leiden, 17 mei 2011.