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New anti-reflecting layers for high contrast imaging in biophonic experiments

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Abstract

Using an Anti-Reflecting layer as supporting plate for imaging an ultrathin film in reflected light with better contrast is a powerful trick. This contrast is defined as the ratio of the difference and the sum of the object and background intensities. Thus, in principles, its value is one when the background reflectance is turned off. For homogeneous, isotropic and purely dielectric materials, single AR layers are defined by the two famous conditions $n_1^2 = n_0 n_2$ and $e_1 = \cdot/4n_1$ ruling respectively the refractive index and the thickness of the layer. Among other applications, such AR-layers may be used in order to probe ligand binding on surface grafted receptors. Then, the AR layer must be positioned between the solid support and the ligand solution, which refractive index is close to that of water. With a glass support for instance, the index condition imposes that the layer index is about 1.27. It does not correspond to any homogeneous material. It is therefore difficult to realize. Here we will present a new family of anti-reflecting layers which are particularly suited for biophotonic applications. They were obtained by a theoretical approach that we will expose. Their number is infinite. We will discuss their performances, their practical use for real time high contrast imaging in ligand-receptor experiments, and their manufacturing. At least, we hope that we will be able to present first experimental results.

Biography

Dominique Ausserre has completed his Ph.D in 1985 in College de France, Paris. he joined the CNRS in 1986 and was a visiting scientist in IBM Almaden in 1987. He started a new lab in Institut Curie in 1988, and moved to Universite du Mans in 1991. He is director of research in CNRS since 1993. As the main inventor of the SEEC technique, he launched the start-up Nanoraptor in 2001. He has published more than 60 papers in reputed journals and filled about 15 patents, covering from instrumental optics to the physics of surfaces, complex fluids and polymers.