Centre de Nanosciences et de Nanotechnologies

Soutenance de thèse

Vendredi 1 juillet
10h00
Amphithéâtre

« Development of resonant nanostructures large area device for augmented reality»

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Link: https://us02web.zoom.us/j/86341050123?pwd=WmVDOHdHYXpoazRwNTNqSmFXVHBvUT09

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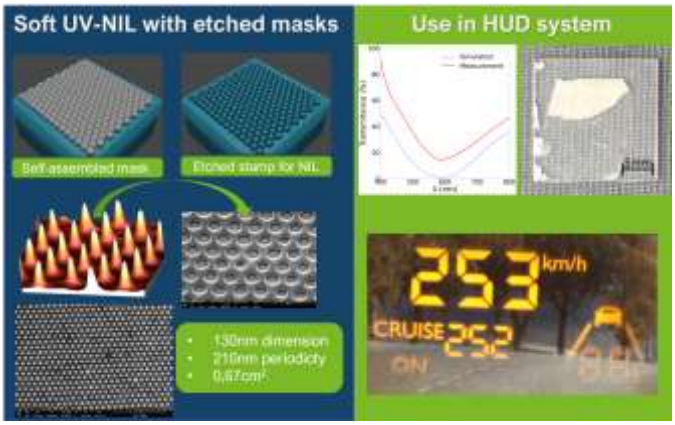
Abstract :

Recently, visualisation systems, and in particular augmented reality, have seen increased use in applications such as automotive head-up displays or head-mounted displays such as Google Glass. Due to the cost constraints of industrial applications, technological solutions are needed to improve the efficiency of these devices. In particular, these systems include a large surface blade that must be both transparent in the visible range and reflective at certain wavelengths. It can also perform the function of focusing or defocusing.



In this context, wavelength-selective reflective metasurfaces are considered good candidates. This type of device has attracted a lot of attention in recent years due to the unique properties that can be obtained but nevertheless, significant improvements are still needed to make it a viable option.
In this work, we address two main areas that we aim to improve. The first is the fabrication of large area devices. Here we present a process based on nanoimprint based on soft stamps (Soft NIL-UV) to fabricate large areas at low cost. The main improvement is a new technique for the fabrication of PDMS stamps based on the self-assembly of polystyrene nanospheres combined with direct etching of PDMS.
The second is the development of tools to study the impact of the order level of the metasurface on the obtained optical effect. In this thesis, we propose to use the structure factor because of its applicability to structures of any order level and its good adaptability to large surfaces when combined with computer vision programs.
We thus show the feasibility of the fabrication of a large surface metasurface, whose optical properties are evaluated with different tools (structure factor, transmittance, macroscopic transparency).

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