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Synthesis of metallic colloidal suspensions of controlled size and morphology for the fabrication of 3D composite objects

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Résumé

The metallic colloidal suspensions known for their different properties (optical, thermal, magnetic) are in huge development and used in many fields such as nanomedicine, electronics, optics and catalysis. Nowadays, 3D printing remains the focus of various industrial researches. However, this technology still suffers from certain limitations, particularly in terms of material choices. During the 80s, « polymer » printing has begun to be studied for 3D impression, ever since, it's challenging to find compatible resins or polymers, which leads to limited range of properties or functionalities of the 3D objects.

The use of metallic colloidal suspension for the elaboration of photosensitive resins would be a way to add new properties to the 3D object and overcome the encountered limits. In this respect, colloidal suspensions are synthesized in different ways. The type of material, the size, shape or synthesis methods allow the modulation of their optical properties[1][2][3]. Those suspensions are mixed into different photosensitive resins and then 3D objects with controlled geometry are photopolymerized. Metallic colloidal suspensions have a plasmonic coupling effect inducing changes according to the interparticles distance. This distance could be tuned using various stimuli such as mechanical stress (mechanochromic)[4]. These materials may find applications in several fields such as sensors or optical filters.

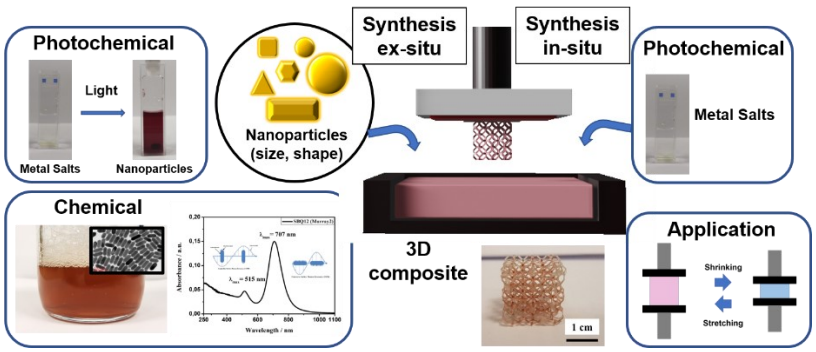

Figure 1. *Global outline of the subject.*

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