NANOCOMPOSITES FOR DLP-SL 3D PRINTING: from materials' engineering to materials' science

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In the last years, 3D Printing (3DP) is increasing its importance both in science and in industrial applications due to the peculiar properties and manifolds advantages that the technologies that are included under this umbrella terms can offer.[1] Without going into details for each technology, it is implied the possibility to produce components with shapes impossible to obtain by classical subtractive manufacturing, saving at the same time both raw materials and energy.[2, 3]. Among polymeric 3D printing processes, light-based technologies (SLA and DLP) are generally known for being the fastest and most precise. However their main drawback consists in the limited palette of available printable materials, which restrict the possible applications.
Aiming to widen the range of printable materials for SL-DLP, here we will show different strategies for producing 3D printable nanocomposites developed in our laboratories (Figure 1). The idea beyond consists in imparting improved mechanical properties or new functionalities to the printed objects maintaining at the same time a good printability. In this context we will show that a classical direct dispersion of fillers in a photocurable formulation followed by the optimization of printing parameters (what we call "the materials' engineering approach")[4, 5] could be overcome by an appropriate design of the photocurable mixture, adding a bit of materials' science and chemistry. This allows to obtain objects with peculiar properties saving a high printability.[6-8]

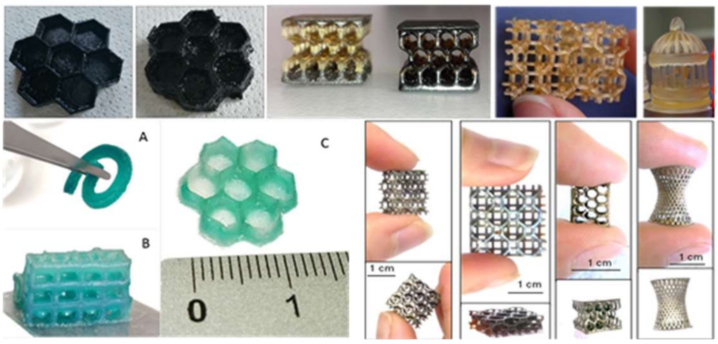

Figure 1 Different nanocomposites printed in our Labs

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