THINK AND PRINT: DESIGN PHOTOCURABLE MATERIALS FOR 3D FUNCTIONAL DEVICES

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In the last decade light-induced 3D printing experienced an explosion of interest, especially from the materials point of view. In fact, while in the past the most of the attention was devoted just to obtain fast and precise printing, in the latest years the focus of academic and industrial research is moving toward the synthesis of materials with improved mechanical properties or with new functionalities.

However, be limited to “material properties” + “design of the structure” archetype doesn’t allow to understand the full potentialities of 3D printing. In this talk, it will be showed possible strategies to overcome this point, obtaining a synergistic effect from photocurable formulations, the local properties of the materials and the devices’ design.

In this context, it will be showed that a controlled selection of the printable materials [1] or of the degree of conversion [2] can be exploited for the fabrication of devices for bio-application. Furthermore, suitable dyes can be engineered beyond the conventional control of the photopolymerization, enabling the fabrication of sensors [3] and optical valves[4]. At last, it will be demonstrated that magnetic nanocomposites could be 3D printed and different type of motions can be exploited properly selecting the matrix rigidity [5]. More interesting, being able to control the microstructure by through orientation of magnetic nanoparticles in a modified DLP 3D printer, can allow to produce 4D printed materials, with controlled movements or shapeshifting.

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