NEW MATERIALS ON VOLUMETRIC ADDITIVE MANUFACTURING

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3D volumetric printing is a clear opportunity to print new miniaturized objects that could be applied on soft matter science, prototyping and/or biomedical applications. This new technique overcome some drawkacks of some of the current popular 3D printing techniques (DLP, SLA, etc.) such as fast speed and no need of support. Nevertheless, there is a myriad of fundamental physico-chemistry properties and precursors materials content in the formulation to be understood and optimized for a required application. During this thesis, precursors of the photopolymerisation reaction will be studied and the better candidates will be integrated into the formulations of different compositions. New monomers composition as well as classical ones will be integrated and physico-chemical properties of the formulations will be studied. Between the targetted candidades, conductive precursors components will be integrated into the formulations, which would allow us to achieve controled complex architectures, including conducting objects. This work will open the way towards new applications in soft robotics, biolectronics as well as environmental detection and remediation. We are looking for a motivated candidate, with expertise on macromolecular or molecular chemistry / materials science, knowledge on physico-chemistry and/or conjugated polymers is a plus. The most important is an open-minded person, with capacity to work rigorously, with enthusiasm and creativiy and who would like to integrate a dynamic team of academic and industrial partnership experience, the LPIM. English / French speaking is a must.

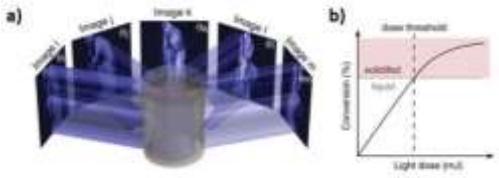

Figure 1: Scheme of volumetric 3D Printing principle [1], technique to be used during this PhD.

This PhD project is part of the environental, industrial and digital transition who responds to current technological breakthroughs in areas such as intelligent functional materials, 3D composites for rapid manufacturing, advanced materials and assembly technologies, 3d printing, biotechnology, etc. The PhD candidate would learn notions on photochemistry and materials desin, additive manufacturing as well as rheological, mechanical, spectroscopical and electrochemical characterisation of materials. Co-direction of the thesis will be performed during the first 2 years to guarantee a proper feedback on photo-chemistry and materials development. Moving to complete direction at the 3rd year of PhD under current CJP (Chair of Junior Professeur) supervision, Ariana Villarroel.

[1] J. Madrid-Wolff et al. MRS Communications **13**, 764-785 (2023).
[2] A. Champion, B. Métral, A.S Shculler, C. Croutxé-Barghorn, C. Ley, L. Halbardier, X. Allonas, ChemPhotoChem **5**, 839-846 (2021).
[3] a) T. Nicolini, A. Villarroel Marquez, B. Goudeau, A. Kuhn, G. Salinas. J. Phys. Chem. Lett. **12(42)**, 10422-10428 (2021). b) A. Villarroel Marquez et al. Macromol. Rapid. Commun. **41(12)**, 2000134 (2020).