



## Abstract A Novel Automated Apparatus for the Synthesis of Biomaterials <sup>†</sup>

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The available strategies for the treatment of complex bone defects, including the use of autografts and allografts, have limited effectiveness and do not successfully promote bone tissue regeneration and vascularization. To meet these demands, intensive research is strongly dedicated to the development of scaffolds that, while filling the gap left by the lack of extensive bone parts, can establish an active cross talk with cells and drive new tissue formation and remodeling. In this respect, biomimicry is today widely acknowledged as a leading concept to develop new approaches based on biomimetic materials to fabricate smart devices with advanced performance and multiple bio-functionalities. It has been a challenge to develop biomimetic materials at a large scale with the desired properties. An automated apparatus will be developed with the aim of synthesizing novel biomaterials and particles (i.e., nano, micro, or macro). In the system, it will be possible to use several reactants and specific synthesis conditions (e.g., temperature, pH) that altogether will guarantee the synthesis of biomaterials with biomimetic properties, comprising biochemical, physical, mechanical, and morphological features, all enrolled in the regulation of a bone regenerative cascade. The successful validation will contribute to speeding up the translation of the proposed technology from the bench-to-bedside, as well as to optimize time and resources required for the development of more effective therapies against bone-related diseases.

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