

Bioactive matrix

A bioactive [matrix](#) is a material used in [tissue engineering](#) and regenerative medicine that provides a scaffold for cells to grow and regenerate damaged tissue. The matrix is typically composed of biocompatible materials, such as natural or synthetic polymers, that mimic the extracellular matrix of the target tissue. Bioactive matrices can also contain bioactive molecules, such as growth factors, to stimulate cell growth and differentiation.

Integrating a [biomimetic extracellular matrix](#) to improve the [microenvironment](#) of [3D printing scaffolds](#) is an emerging [strategy](#) for [bone substitute](#) design.

A “soft-hard” bone implant (BM-g-DPCL) consisting of a [bioactive matrix](#) chemically integrated on a [polydopamine](#) (PDA)-coated porous gradient scaffold by polyphenol groups is constructed. The PDA-coated “hard” [scaffolds](#) promoted Ca²⁺ chelation and mineral deposition; the “soft” bioactive matrix is beneficial to the [migration](#), [proliferation](#), and osteogenic differentiation of [stem cells in vitro](#), accelerated endogenous [stem cell](#) recruitment and initiated rapid [angiogenesis](#) in vivo. The results of the [rabbit cranial defect model](#) ($\Phi = 10$ mm) confirmed that BM-g-DPCL promoted the integration between [bone tissue](#) and [implant](#) and induced the deposition of [bone matrix](#). [Proteomics](#) confirmed that [cytokine](#) adhesion, biomineralization, rapid [vascularization](#), and [extracellular matrix](#) formation are major factors that accelerate [bone defect healing](#). This strategy of highly chemically bonded soft-hard components guided the construction of the bioactive regenerative scaffold ¹⁾.

¹⁾

Liu Q, Chen M, Gu P, Tong L, Wang P, Zhu J, Xu Y, Lu G, Luo E, Liang J, Fan Y, Zhang X, Sun Y. Covalently Grafted Biomimetic Matrix Reconstructs the Regenerative Microenvironment of the Porous Gradient Polycaprolactone Scaffold to Accelerate Bone Remodeling. *Small*. 2023 Feb 11:e2206960. doi: 10.1002/smll.202206960. Epub ahead of print. PMID: 36772909.

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