

## Artificial extracellular matrix for embryonic stem cell cultures: a new frontier nanobiomaterials

### REVIEW ARTICLE

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**Abstract** Nanobiomaterials can play a central role in regenerative medicine and tissue engineering by facilitating cellular behavior and function, such as those where extracellular matrices (ECMs) direct embryonic stem (ES) cell morphogenesis, proliferation, differentiation and apoptosis. However, controlling ES cell proliferation and differentiation using matrices from natural sources is still challenging due to complex and heterogeneous culture conditions. Moreover, the systemic investigation of the regulation of self-renewal and differentiation to lineage specific cells depends on the use of defined and stress-free culture conditions. Both goals can be achieved by the development of biomaterial design targeting ECM or growth factors for ES cell culture. This targeted application will benefit from expansion of ES cells for transplantation, as well as the production of a specific differentiated cell type either by controlling the differentiation in a very specific pathway or by elimination of undesirable cell types.

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