

MSN based biointerfaces to advance knowledge on ligand-stem cell interaction

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Propositions

Accompanying the dissertation

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by

Xingzhen Zhang

Maastricht, 28th February 2024

1. Spatial organization of adhesion ligands plays an important role in integrin-mediated adhesion of stem cells. (This thesis)
2. DNA-modified mesoporous silica nanoparticles (MSN)-based films can be used as versatile biointerfaces to study stem cell adhesion processes. (This thesis)
3. DNA is promising as an engineering material to create biointerfaces, due to its highly programmable nature. (This thesis)
4. Knowledge on how ligand immobilization strategies influence stem cell-material interactions is essential for developing improved bioactive biomaterials and facilitating clinical translation of stem cell-based therapies. (Impact of this thesis)
5. Reversible chemistry such as host-guest supramolecular chemistry, coordination chemistry and dynamic covalent chemistry can be used for fabricating extracellular matrix-mimicking biomaterials. (Ma et al. Accounts of Chemical Research, 2019)
6. Regulation of mesenchymal stem cells adhesion enables control over their growth and targeted differentiation, which are important mechanisms for tissue regeneration. (Roberts et al. ACS Nano, 2016)
7. Hydrogels incorporating MSN possess increased bioactivity and improved mechanical properties. (Zengin et al. Nanoscale, 2021)
8. Nothing in life is to be feared, it's only to be understood. Now is the time to understand more, so that we may fear less. (Maria Salomea Skłodowska-Curie)
9. An artisan must first sharpen his tools if he is to do his work well. (Confucius)

子曰：工欲善其事，必先利其器