201 A multifaceted approach to non-viral gene delivery

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Gene delivery is the transfer of genetic material into recipient cells to alter some functions. As the spontaneous entry of naked nucleic acids into cells is unfortunately very ineffective, gene delivery vectors have made their breakthrough in basic and medical research.
Non-viral gene-delivery agents, i.e., cationic lipids and polymers, self-assemble with polyanionic nucleic acids to give rise to nano/microparticles called lipoplexes and polyplexes, respectively, that are taken up by cells to elicit their function, but do not display the required efficacy yet.
This talk will chronicle the road towards the development of more and more effective gene delivery vectors.
Key issues, such as why and how to shape gene delivery complexes at the nano/microscale, which is the effect of their interplay with biological fluids, how to harness gene delivery vectors with cell-targeting properties and antimicrobial activity to improve their overall behaviour will be dealt with. Besides, the use of physical forces to disrupt the cell membrane and increase the effectiveness of non-viral gene delivery vectors has been recently envisioned, and will be discussed in this talk.
In order to speed up the optimisation process, there really is an urgent need to develop new tools and technologies for the unbiased, straightforward, and quantitative assessment of transfection efficiency and cytotoxicity. A promising approach facing such biologically relevant issues relies on the design of miniaturized and easy-to-use devices. Lab-on-chip (LoC) platforms to perform transfection assays for the selection of more and more effective gene delivery vectors will be presented as well.

202 Understanding phase transformations in a metastable β-titanium alloy after electron beam surface structuring

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Metastable β-titanium (Ti) alloys are very good candidates for implants in the very hostile human body because of their high corrosion resistance, good biocompatibility and good fatigue strength. The surface topography of implants plays an important role in the cell growth to improve bone anchorage. Among all the surface modification techniques, electron beam (EB) technique is a promising technique to modify the surface by means of focused melting deflections, provoking fast heating/cooling rates during the process. The higher solidification rate promotes the formation of a hard ω_{ath}-phase in nanometre size and heterogenous element partitioning. The evolution of this phase and the formation of ω_{iso} and α phases in polycrystalline alloys after EB technique is not yet well understood. The purpose of this work is to compare the evolution of different phases of a Ti-15Mo alloy in β annealed and EB conditions during the heating. In-situ synchrotron radiation experiments were carried out by coupling wide-angle X-ray scattering (WAXS) and small-angle X-ray scattering (SAXS) measurements to determine the phase formation temperature, particle size evolution, spatial array, mean distance and volume fractions for different heating rates between 5 to 300K/min.