ABSTRACT
Polynucleotides (PNAs) are outstanding molecular properties that make it an ideal candidate for certain biomedical implant applications, however it lacks biocompatibility. Biocompatibility allows for direct tissue attachment at the two interfaces, enabling material function, while preventing tissue misappraisal. To induce biocompatibility, PU was coated with a layer of hydroxyapatite (HA) in a sol-gel/spray-coating method. The effect of coating of solvated PNA was examined on cell viability, cell proliferation, and cell differentiation.

Surface Coated Polyurethane
with Improved Bioactivity and Cytocompatibility

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INTRODUCTION
Biocompatibility of hard biomaterials still remains one of the major challenges in biomaterials science. Conventional solutions to enhance cell-to-surface interactions include the use of chemical plasma treatments, which are only capable of modifying the surface chemistry and eliminating the toxic substances, but are not able to significantly improve the biocompatibility. Hydroxyapatite (HA) is a mineral that constitutes bone and is therefore naturally well tolerated and grafted into bone to replace missing bone.

METHODOLOGY
Coating of hydroxyapatite onto polyurethane

Figure 1A: Coating of hydroxyapatite onto polyurethane

Figure 1B: Sample preparation performed by a solvent-compression method and XRD spectrum of coating (A) on PU prepared by a solvent-compression method and XRD spectrum of coating (B) on uncoated PU surfaces and Figures 6 c, d, g, h, k and l are cells shown in SBF for 9 days, while the virgin uncoated PU substrates were dried at 60°C for 48 hours, with 10 water changes.

RESULTS
Characterisation of HA coatings

Figure 2: HA coating on PU prepared by a solvent-compression method and XRD spectrum of coating (A) on PU prepared by a solvent-compression method and XRD spectrum of coating (B) on uncoated PU surfaces and Figures 6 c, d, g, h, k and l are cells shown in SBF for 9 days, while the virgin uncoated PU substrates were dried at 60°C for 48 hours, with 10 water changes.

SBF testing for bioactivity

Figure 3: EDS spectra of HA coated PU before and after SBF treatment showing presence of the apatite phase in the SBF.

Cell morphology

Figure 4: EDS crystalline order (A) and phosphate (B) loss in SBF containing no sample (control), uncoated PU substrate and HA coated PU.

CONCLUSION
Surface coating by a sol-gel/spray-compression method, displayed a microcrystalline, relatively homogeneous lamella that was strongly bound to the HA coating. HA coated PU substrates showed increased cellular adhesion of cells in SBF, while the major advantage of HA substrates was an increased rate of cellular attachment and proliferation. The HA coated PU substrates have demonstrated improved cell affinity towards bone, cartilage, and soft tissues, and will thus be suitable for further investigation in soft tissue engineering, including further replacement and musculoskeletal implants, as well as in soft tissues, bone, etc.