

INTERDIGITATED ELECTRODE STRUCTURES FOR OSTEOLAST GROWTH STUDIES

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Integrating electrode structures with biomimetic surface films offers the possibility to measure stimulation of cell growth by electric fields as well as characterization of cell activity from frequency dispersive complex impedance measurements.

To study the growth of osteoblasts (bone-producing cells) we have fabricated interdigitated electrode arrays under a dielectric over layer of hydroxyapatite (HA) which is the mineral content of bone. Atomic Layer Deposition (ALD) was used to deposit the HA film. ALD was chosen as it is a low temperature deposition technique thereby minimizing disturbance to the integrity of the electrode structure. The combination of nanometer –scale electrodes with a 50 nm thick HA layer allows effective penetration of the electric field to the HA/growth media interface where the cells grow. The advantage of this is that mV probe voltages can be used which are small compared to the resting potential across plasma membranes.

Here we present in detail the development of the fabrication technique and some preliminary results on biocompatibility.

Keywords:

Hydroxyapatite, osteoblast, interdigitated electrodes