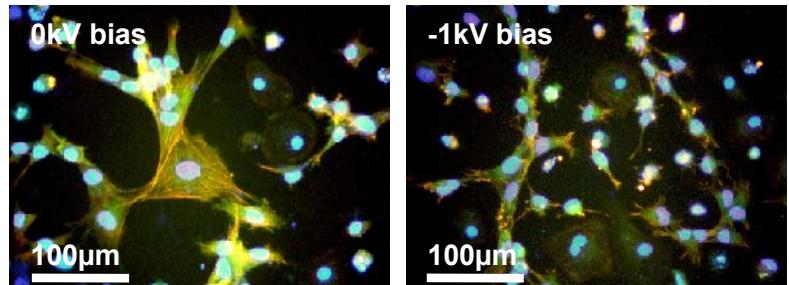


# Hard Ti Based Coatings for Implants

## Background:

Titanium and its alloys show excellent biocompatibility, but the mechanical surface properties are not satisfying.



## Objective:

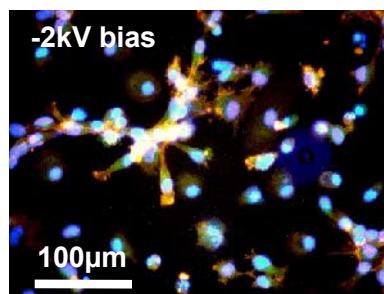
Are the hard coatings TiN and TiAlN candidates for bone integrated implants?

## Method for Coating:

### Plasma Immersion Ion Implantation and Deposition

## Method:

Bone marrow cells were seeded out on these coatings using medium with serum or without serum.



## After 6 hours:

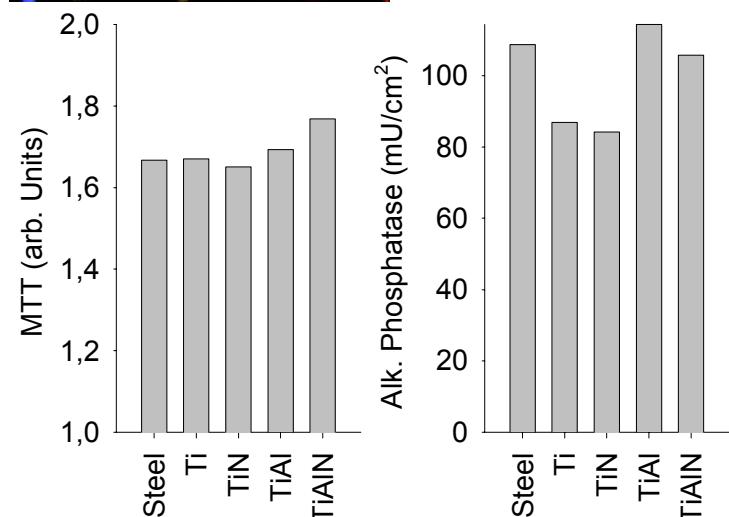
- Lactate dehydrogenase in the supernatant as indicator for cytotoxicity
- Stain for adhesion proteins and cytoskeleton to see the cell adhesion

## After 14 days:

- MTT assay as marker for cell metabolism
- Alkaline phosphatase as marker for osteoblast differentiation.

## Results:

- ✓ There was no difference in cell behaviour when using medium with serum.
- ✓ Either with or without serum there was no sign of cytolytic cell death.
- ✓ Without serum cells adhere best on coatings produced bias voltage. Under these conditions TiAlN performed best (Fig. 1)
- ✓ After two weeks good metabolism and osteoblastic differentiation was found. (Fig. 2)



**Fig 2:** Good metabolic activity (left) and osteoblastic differentiation (right) on TiN and TiAlN coatings.

## Conclusion:

The hard coatings TiN and TiAlN are biocompatible and principally can be used as implant coating. The deposition parameters for optimal growth of bone forming cells must be specified.