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# BIOMATERIALS

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## Evaluation of anti-biofilm properties of titanium nitride coatings: An *in vitro* study

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**Statement of the Problem:** Biomaterial associated infections are challenging to treat due to bacterial biofilm formation. Infections around dental implants (so called peri-implantitis) may occur both shortly after implantation as well as after several years. Some risk factors are patient related, such as a prior history of periodontitis, poor oral hygiene, and smoking. However, product properties have also been indicated to influence the risk, progression, and resolution of peri-implantitis. It is hypothesized that anti-biofilm surface modifications may have a counteracting effect in the progress of infection and thereby reducing the risk of infection. Titanium nitride (TiN) coatings are used for dental abutments due to its golden color, but have also been found to accumulate less amounts of plaque. However, there is limited knowledge on possible mode of action. The purpose of this study is to characterize the surface properties of TiN and to investigate biofilm formation on TiN in comparison with Ti.

**Methodology:** Pre-conditioned specimens were incubated with a co-culture of different oral bacterial species for up to four days. Biofilm formation was evaluated with plate counts, qPCR, live/dead, and crystal violet. Ti and TiN specimens were also characterized using a set of different surface analytical techniques.

**Findings:** After 24 h, plate counts showed a log 2 reduction of bacterial load on TiN compared to Ti, while qPCR failed to show a difference. Live/dead indicated that the biofilm is thinner on TiN than on Ti.

**Conclusion & Significance:** TiN was found to have a certain degree of anti-biofilm properties *in vitro*. However, any conclusions on clinical significance need data from randomized clinical studies.

### Biography

Anna Arvidsson has her expertise in biomaterials and medical device surfaces, with a specific interest related to infection. She has an interdisciplinary background within engineering biology, directed towards biomaterials. During years at Göteborg University with research on surface mediated interactions at the bone/soft tissue implant interface, she has gained experience in surface modifications, surface characterization, and *in vitro* and *in vivo* models. Based on this knowledge, she is now creating and exploring new innovations at Dentsply Sirona Implants with purpose to further improve dental implant treatments and tissue regeneration.

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