



Effects of Anodization and Instrumentation on Titanium Abutment Surface Characteristics and Biofilm Formation

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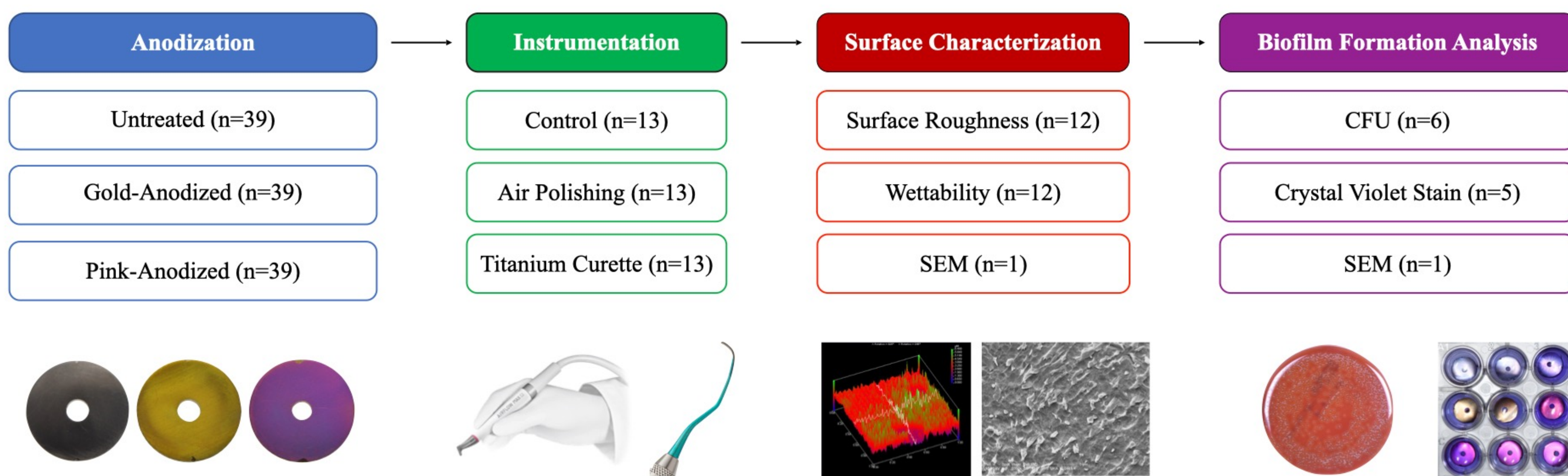
Introduction

Anodized titanium abutment has been proposed as a novel option to restore implants in the esthetic zone. However, there is limited evidence-based maintenance protocol to achieve long-term peri-implant health.

Aim

To evaluate effects of anodization and instrumentation on titanium surface characteristics and biofilm formation. To provide preliminary evidence to develop a rational maintenance protocol for anodized titanium abutment.

Experimental Design



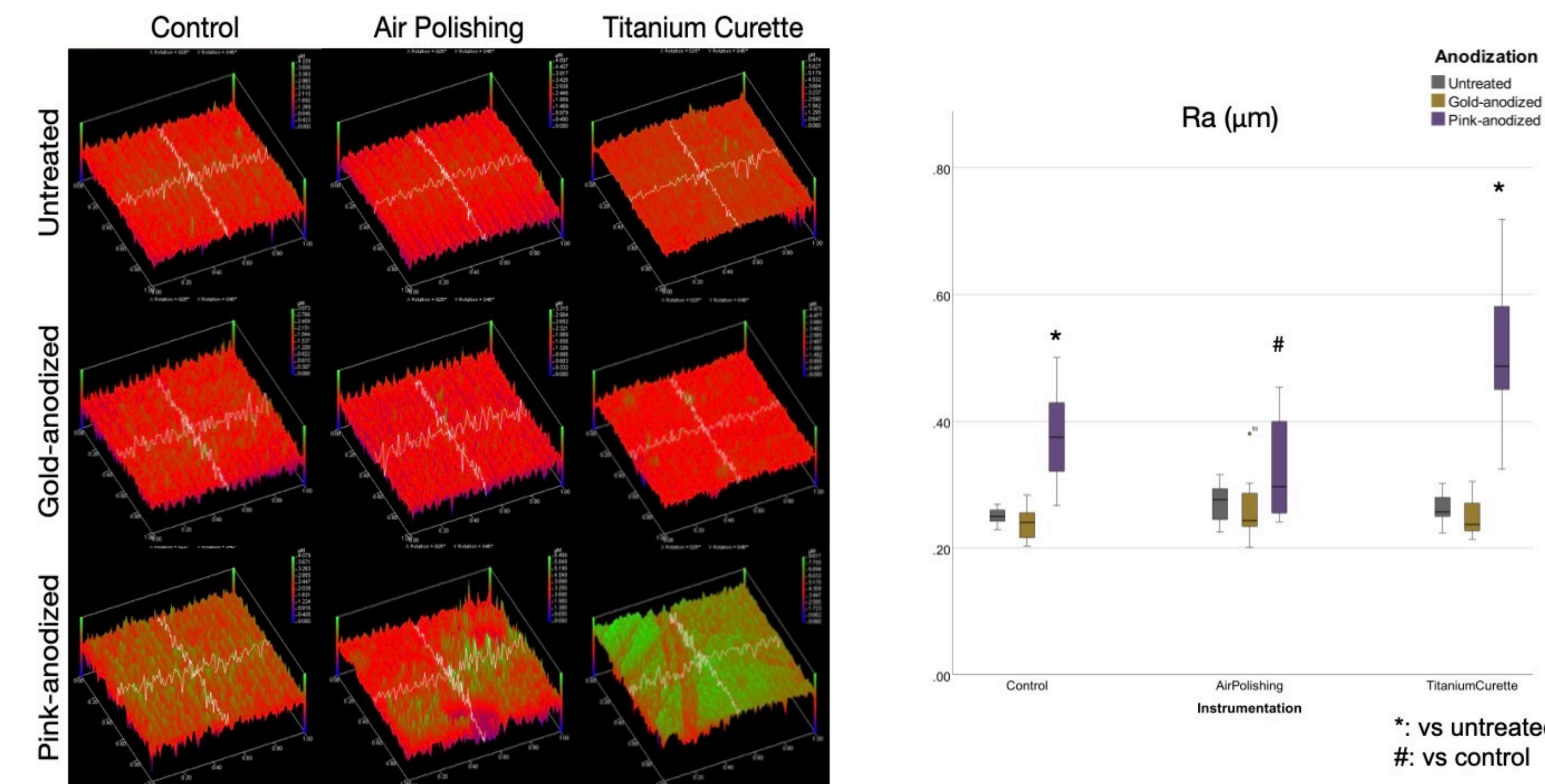
Material & Methods

Polished titanium-6aluminum-7niobium disc samples were divided into untreated, gold-anodized, and pink-anodized groups. Instrumentation methods included control, air polishing, and titanium curette treatment. Surface roughness was measured using an optical profilometer, and wettability was determined using a contact angle goniometer. Biofilm formation by *S. sanguinis* was evaluated through colony forming unit (CFU) counting. Two-way ANOVA to determine the group differences, and Spearman correlation (ρ) to analyses the correlation among surface roughness, wettability, and CFU. ($\alpha = 0.05$)

Results

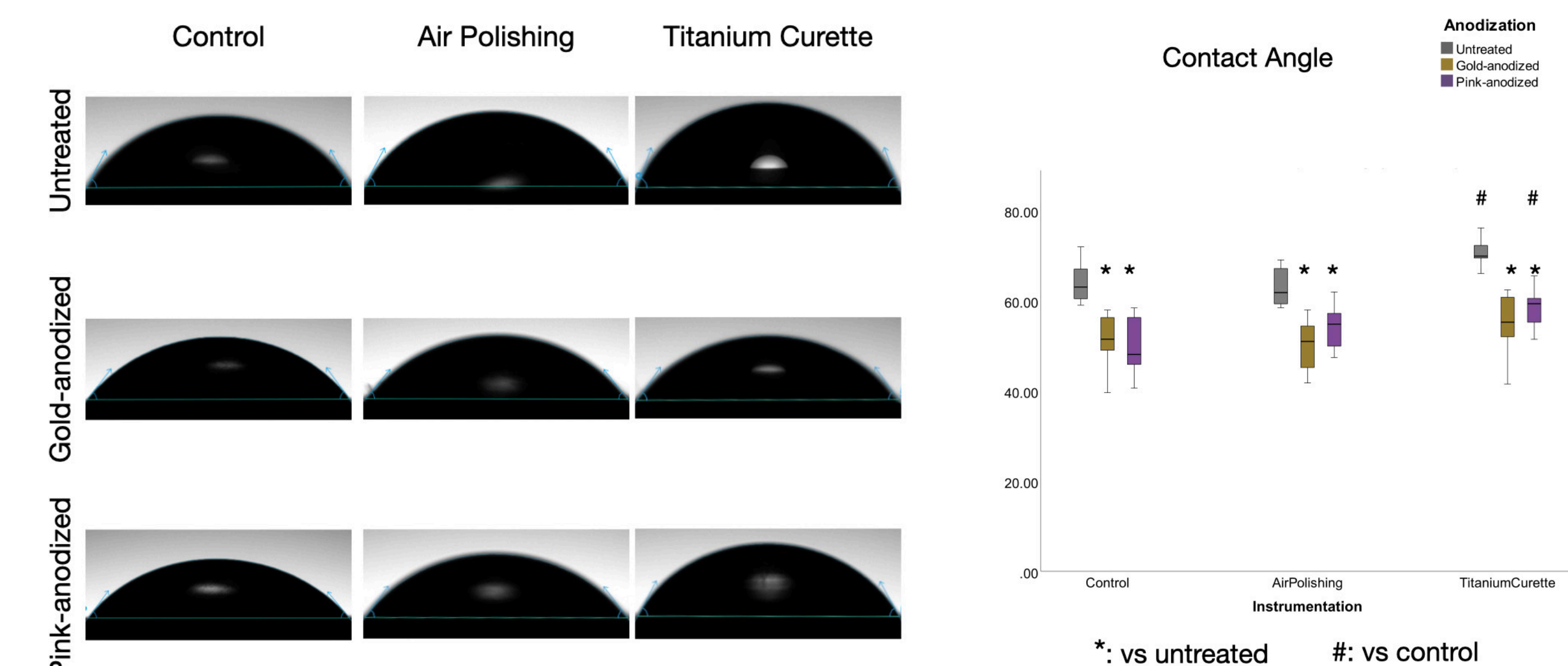
Surface Roughness

- roughened by pink anodization
- smoothened by air polishing

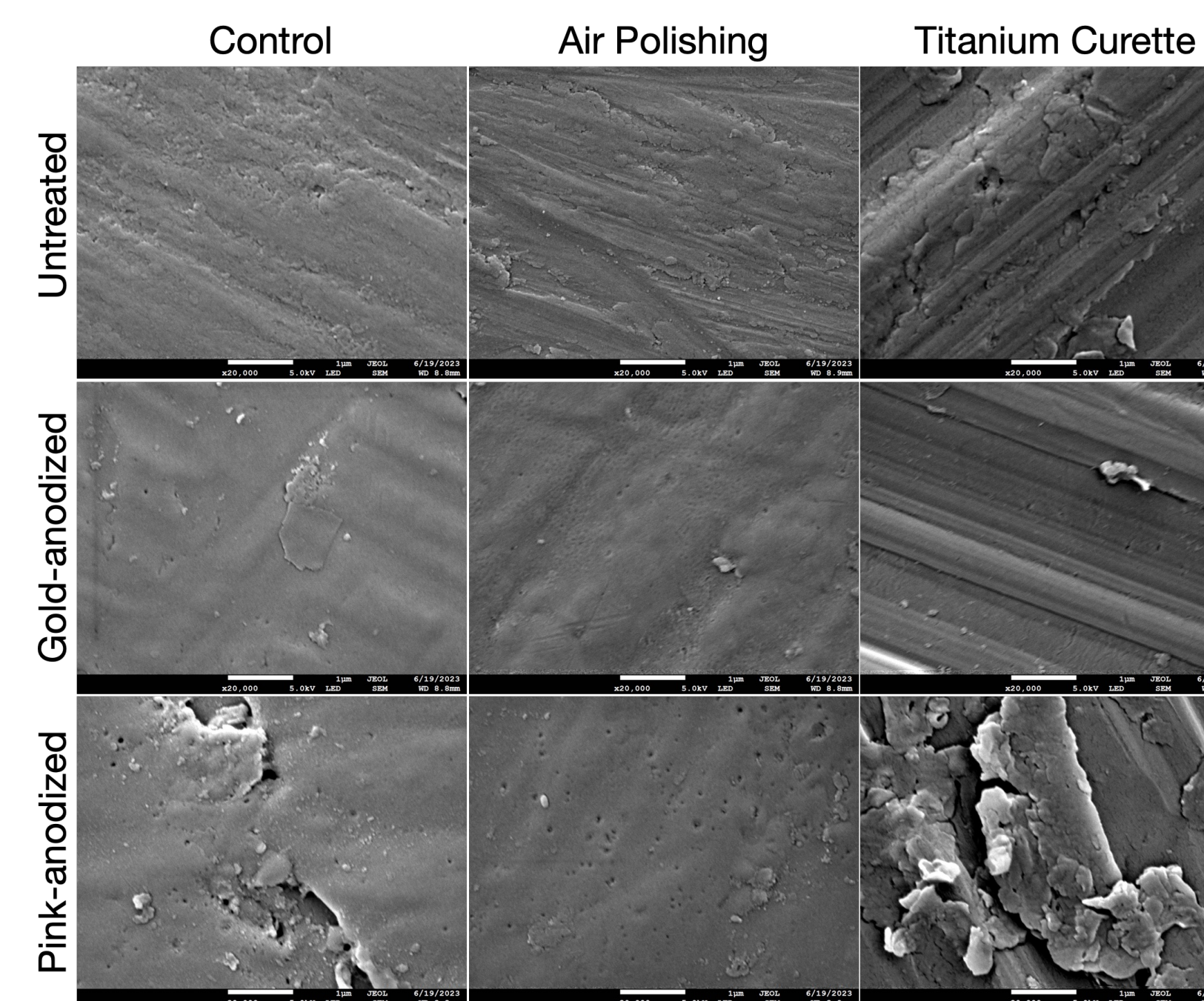


Wettability

- increased with anodization
- decreased with titanium curetting

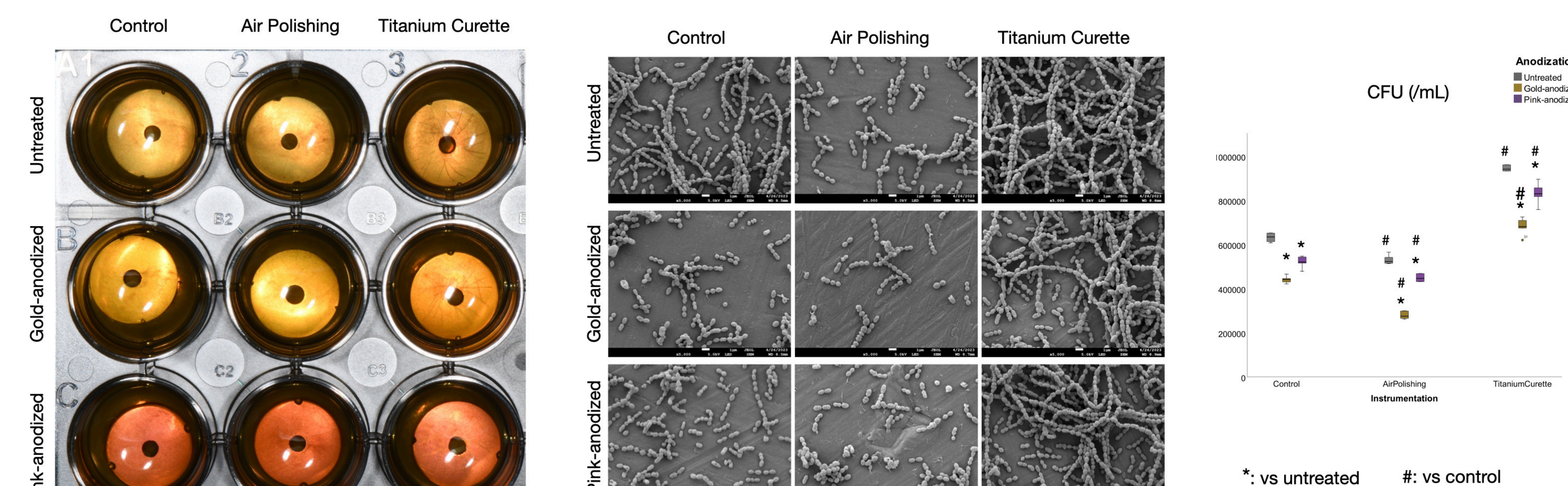


Surface Characterization



Biofilm Formation

- inhibited by anodization and air polishing
- promoted by titanium curetting



Conclusions

Both gold- and pink-anodized titanium were more hydrophilic and led to less biofilm formation. Biofilm formation was inhibited by anodization and air polishing, while promoted by titanium curetting. Gold-anodized titanium instrumented with air polishing, causing the least biofilm formation, was recommended.