

Engineering the Multi-Enzymatic Activity of Cerium Oxide Nanoparticle Coatings for the Antioxidant Protection of Implants

Nicholas J Abuid, Ph.D.; Morgan E Urdaneta, Ph.D.; Kerim M Gattas-Asfura, Ph.D.; Caterina Zientek,; Cristina Isusi Silgo; Jose A Torres; Kevin J Otto Ph.D.; Cherie L Stabler, Ph.D.*

Supporting Information

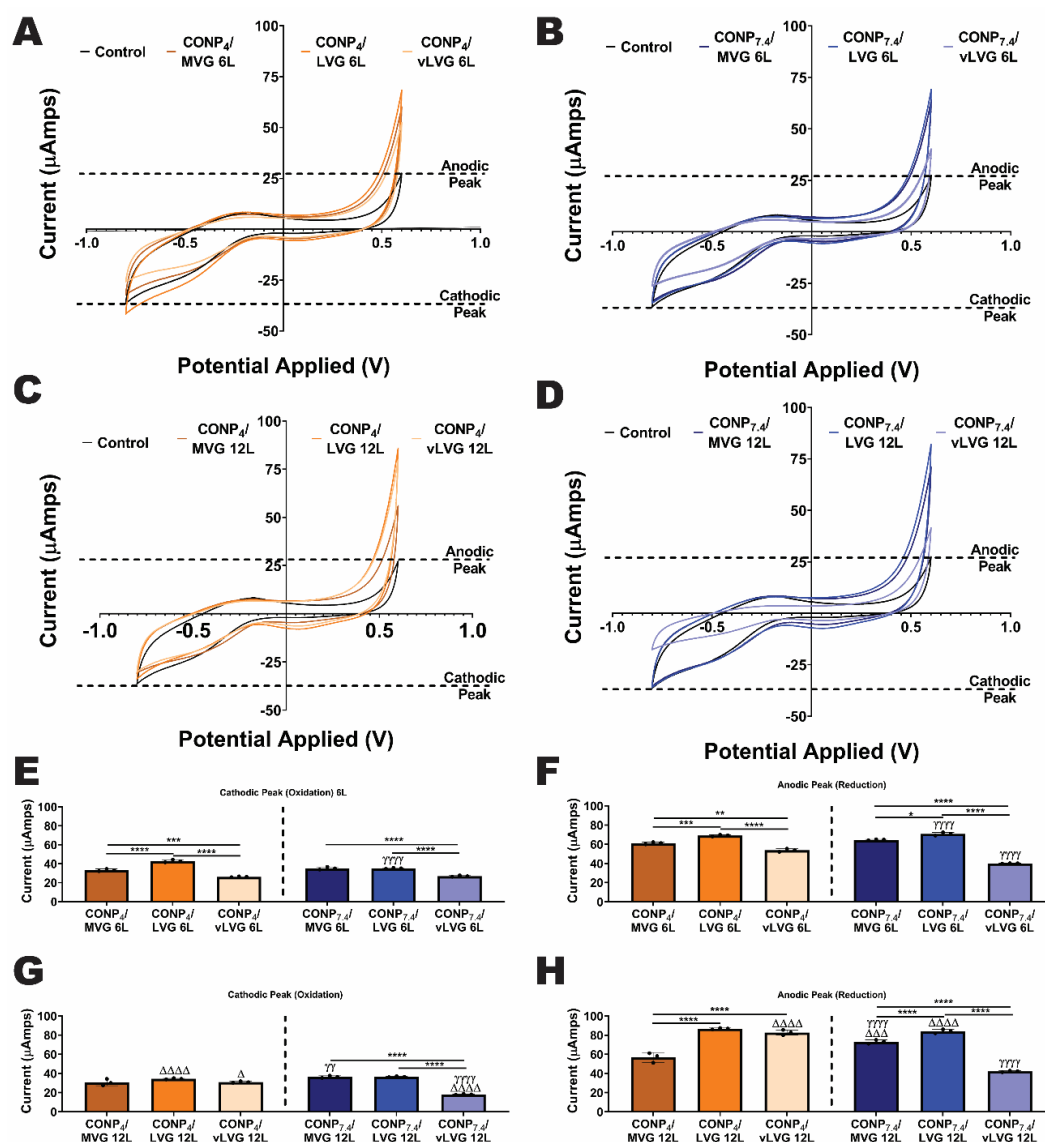


Figure S1. The redox activity of stainless-steel wires coated with A&B) 6- and C&D) 12-layers of different CONP/Alginate formulations. E-D) Summary of the max peak current of the oxidation (anode: an) and reduction (cathode: cat) from wires coated with designated formulations. Dotted line: Max peak cathode current from uncoated wire. Dashed line: Max peak anode current from uncoated wire. Two- way and one- way ANOVA with Tukey's post- hoc test:**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$, where * represents differences between groups, Δ compares six-and twelve-layer coatings, and γ compares groups with same alginate MW and varying pH of CONP.

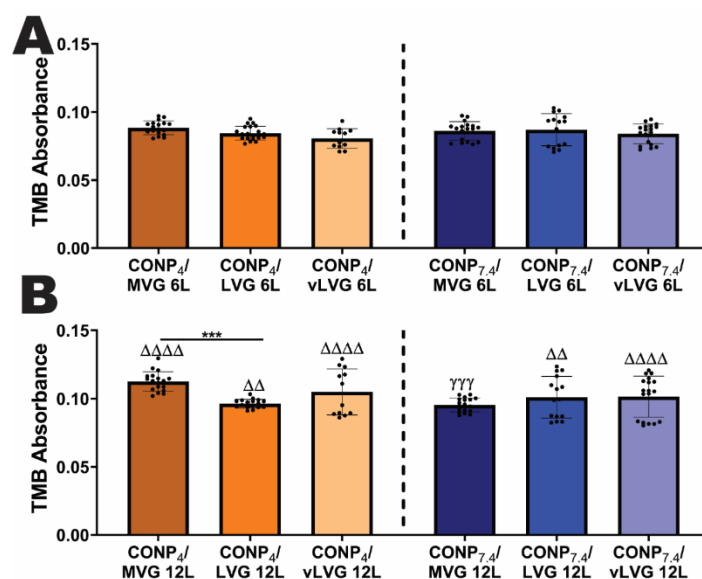


Figure S2 Quantification of TMB oxidation in the bathing solution following incubation with (A) 6- and (B) 12-layer coated microbeads. Two- way and one- way ANOVA with Tukey's post- hoc test: **** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$, where * represents differences between groups, Δ compares six- and twelve-layer coatings, and γ compares groups with same alginate MW and varying pH of CONP.

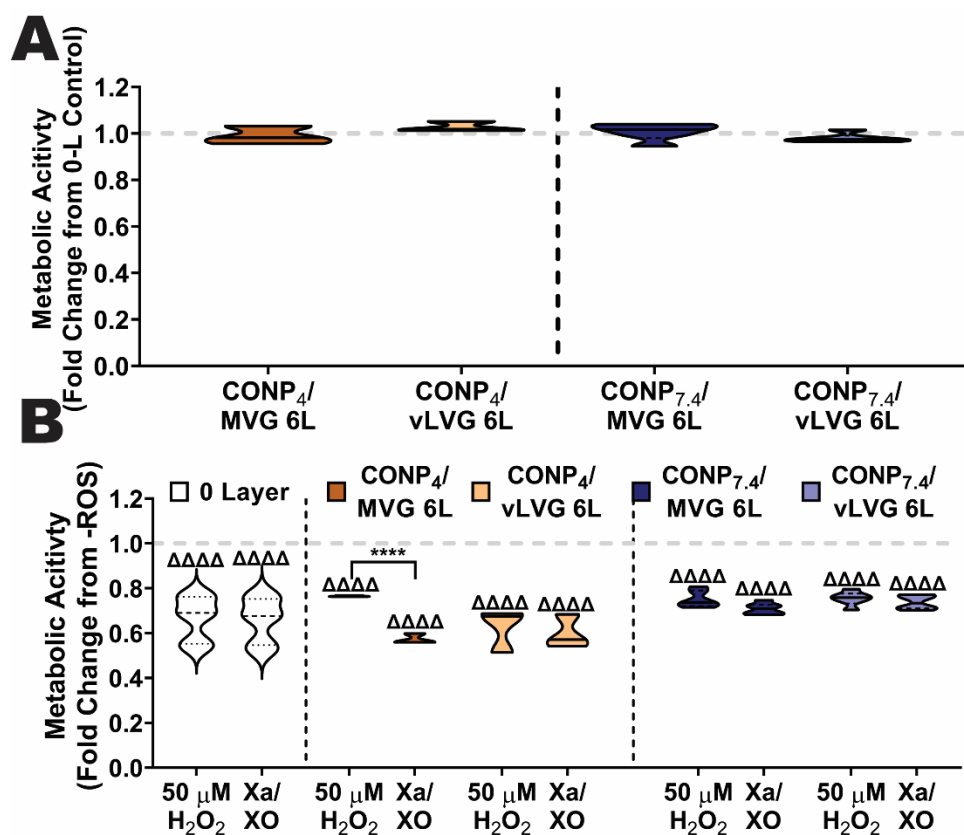


Figure S3 The baseline metabolic activity (A) of encapsulated cells following coating with 6-layers of the designated coating formulations summarized as fold change from uncoated controls (grey dashed line). The impact of oxidative stress from either H_2O_2 or Xa/XO (SO generating) on the underlying cells (B) was evaluated via metabolic activity and summarized as fold change from

untreated controls (grey dashed line). Uncoated or microbeads coated with 6-layers of the designated coating formulations were tested. Two- way and one- way ANOVA with Tukey's post- hoc test: **** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$, where * represents differences between groups, and Δ compares 12-L coatings to 0-L beads.