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Contribution ID: **3190** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Quantifying radiolysis effects for in-situ Rutherford Backscattering Spectrometry (RBS)

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The titanium oxide surface is responsible for many of the properties associated with the metal, creating a hard, uniform, and thermodynamically stable protective coating. Because of these characteristics, titanium has found uses in biomedical implants, aerospace engineering, corrosive industrial piping, and other areas where high strength and low weight are required. Our project is aimed on the understanding of atomistic mechanisms of TiO2 formation, using Rutherford Backscattering Spectrometry (RBS) for elemental depth profiling during the growth, including oxidation rates, and role of anodization potential on Ti oxide layer structure and morphology. RBS is a powerful ion beam analysis tool used to determine thickness at a nanometer scale, such as that of the oxide observed on titanium and elemental depth distribution

Our research involves using a specially designed in-situ cell with an ion-permeable silicon nitride window to provide a barrier between the ultra-high vacuum (UHV) required to perform RBS and the liquid electrolyte solution required for anodization. The thin silicon nitride window is coated with titanium and exposed to the liquid electrolyte; RBS measurements are taken as the titanium metal is anodized to titanium oxide. To determine information about the growth mechanism of titanium, in-situ anodization during RBS is performed, leading to information about the growth mechanism of titanium oxide. In-situ RBS results show a significant increase in the oxidation rate of titanium compared to equivalent ex-situ measurements, as well as spontaneous TiO2 film growth, without applied potential, in the presence of high-energy He+ particles interacting with electrolyte. The preliminary findings as to the radiolysis products of liquid electrolyte accelerating the oxide growth rate of titanium oxide in-situ will be presented.

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