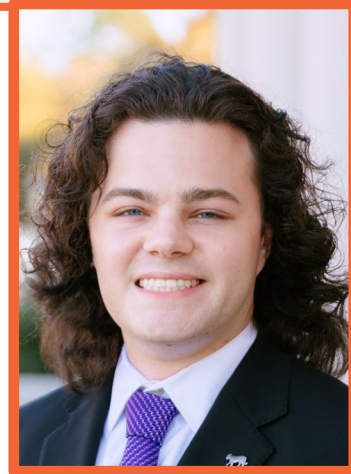


# Graduate Student Research Seminar

## Spring 2025

### Influence of Carbon Concentration on the Deformation Behavior of 201 Stainless Steel

**Ryan Erminio (PhD student)**  
**Advisor: Marian Kennedy & Garrett Pataky**



**Monday, October 27<sup>th</sup>**  
**3:00 pm (EST) – 132 Fluor Daniel Building**

#### Abstract

200 series stainless steels have a lower-nickel concentration relative to 300 series stainless steels, often resulting in a lower cost. For these stainless steels, there are several deformation mechanisms that can occur. In SS201, a representative grade, previous studies have shown that carbon concentration can affect the rate of the strain-induced martensite formation (SIM) in TRIP steels, favoring a two-stage transformation:  $\gamma$ -austenite  $\epsilon$ -martensite (HCP) followed by  $\epsilon$   $\alpha'$ -martensite (BCC). The predictability of cracking within SS201 specimens is low, and there is a need to better understand why. In this study, we analyzed cracking, hardness, phase, distribution and sizes of grains in several samples that varied in carbon composition. Findings suggested that specimens with higher carbon content than 0.05 wt% lead to a higher incidence of cracking. Further research was performed to determine strain behavior in thin samples under tensile load. Microstructure evolution and mechanical properties, including yield strength, were also investigated.



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