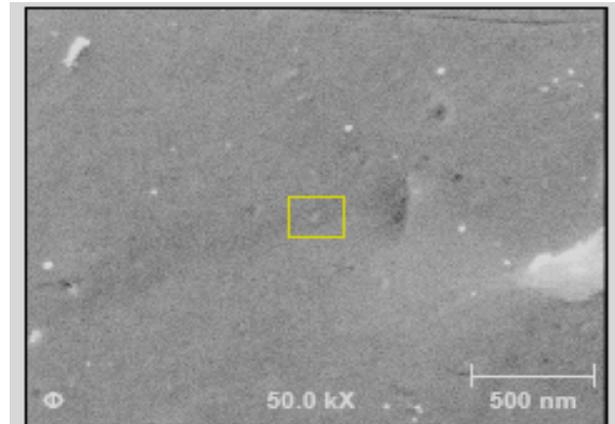


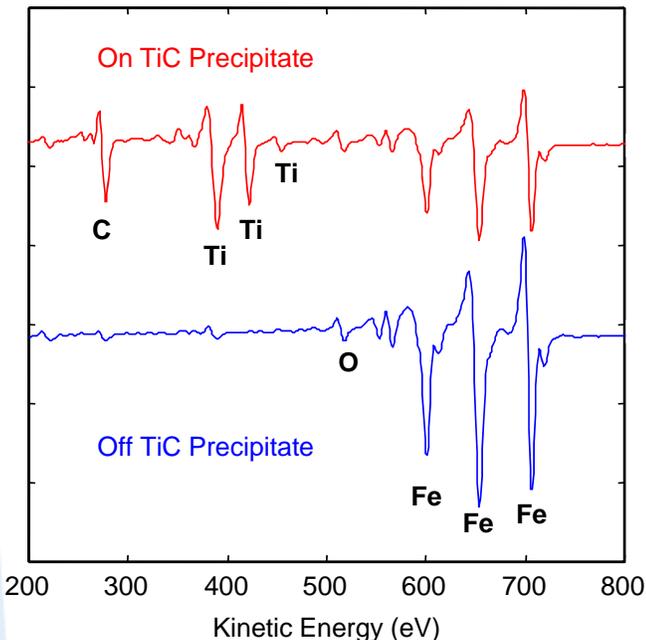
# Characterizing Nano-Scale Precipitates in Steel with the PHI 700Xi Scanning Auger Nanoprobe

## Introduction

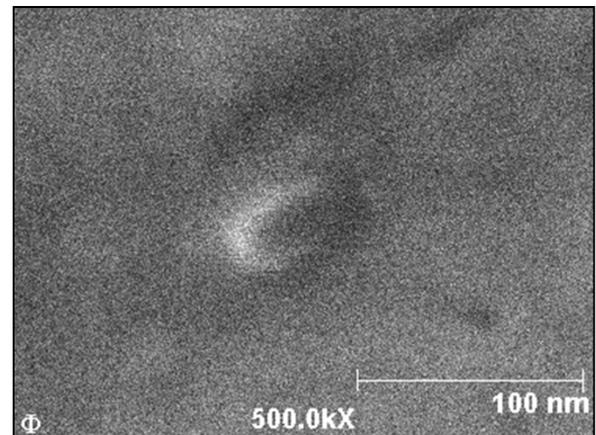
A sample of a high tensile strength, hot rolled steel was polished and etched to expose precipitates. A number of small precipitates are visible in the 50 kX secondary electron image. The 500 kX secondary electron image shows a typical precipitate to be approximately 50 nm in diameter. Auger spectra collected on and off of the precipitate show it to contain Ti and C. Auger maps show the distribution of Ti and C matches the shape of the precipitate observed in the secondary electron image. Secondary electron images were obtained using a 20 kV- 1 nA electron beam. The Auger spectra and maps were collected using a 20 kV – 2 nA electron beam.



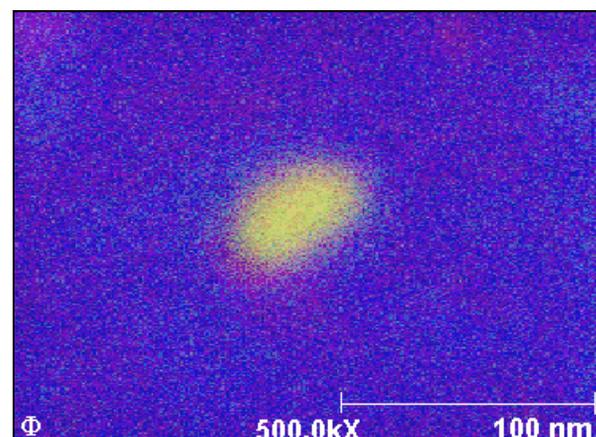
Secondary electron image of a polished and etched steel sample showing the presence of many small precipitates (50 kX original magnification)



Spectra collected on and off the precipitate show it to be a titanium carbide precipitate



Secondary electron image of a 50 nm precipitate (500 kX original magnification)



Auger Maps of the 50 nm precipitate  
Color overlay display Fe – Ti – C

## Summary

The PHI 700Xi provides the highest spatial resolution and sensitivity available for nano-scale Auger analysis making it possible to routinely characterize sample features with dimensions of less than 100 nm. In this example, spectra and elemental maps showed 50 nm features detected in secondary electron images to be titanium carbide precipitates.



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