

Sample Thickness Investigation by Electron Microscope Measurement

Ted Lietz

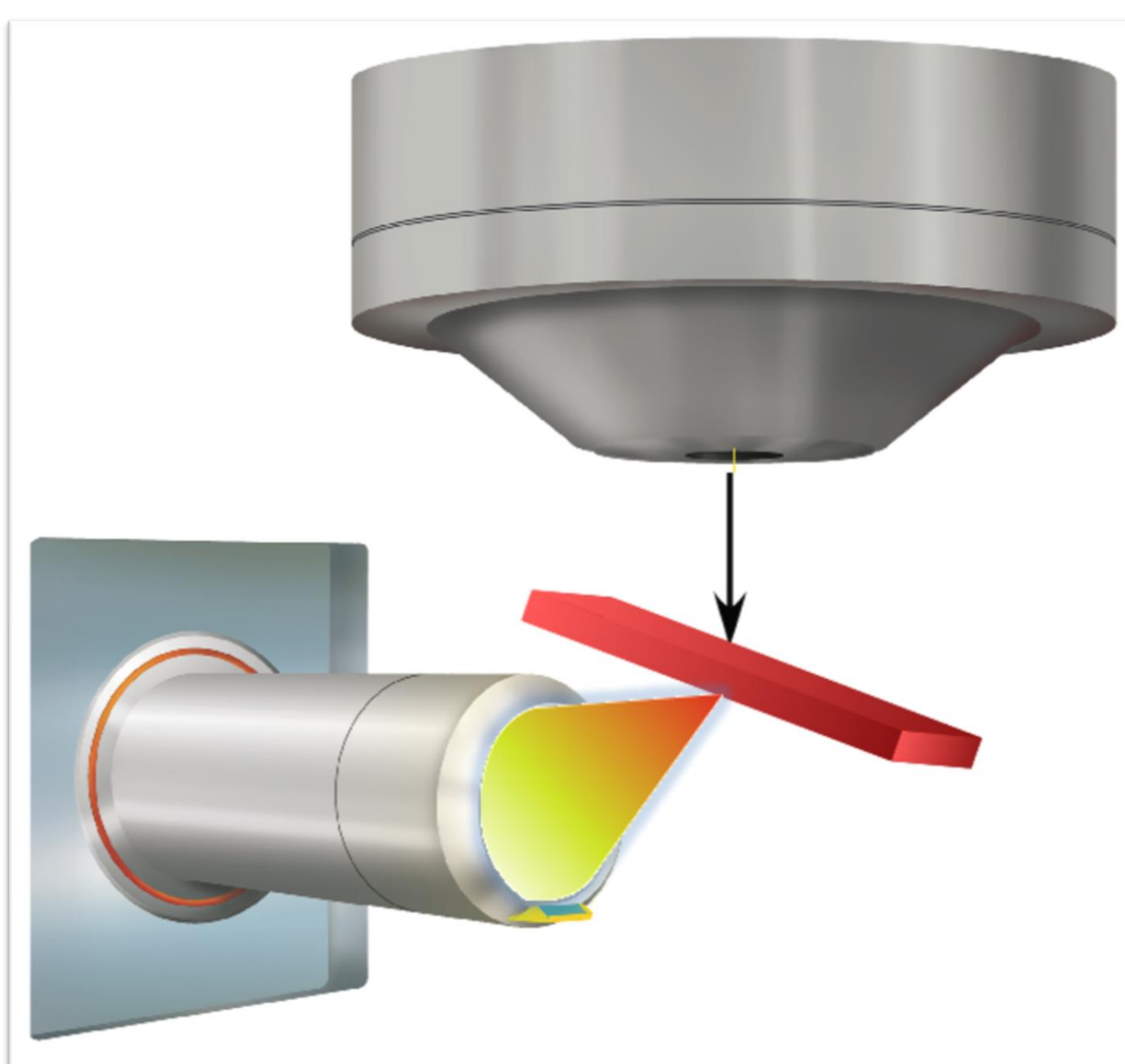
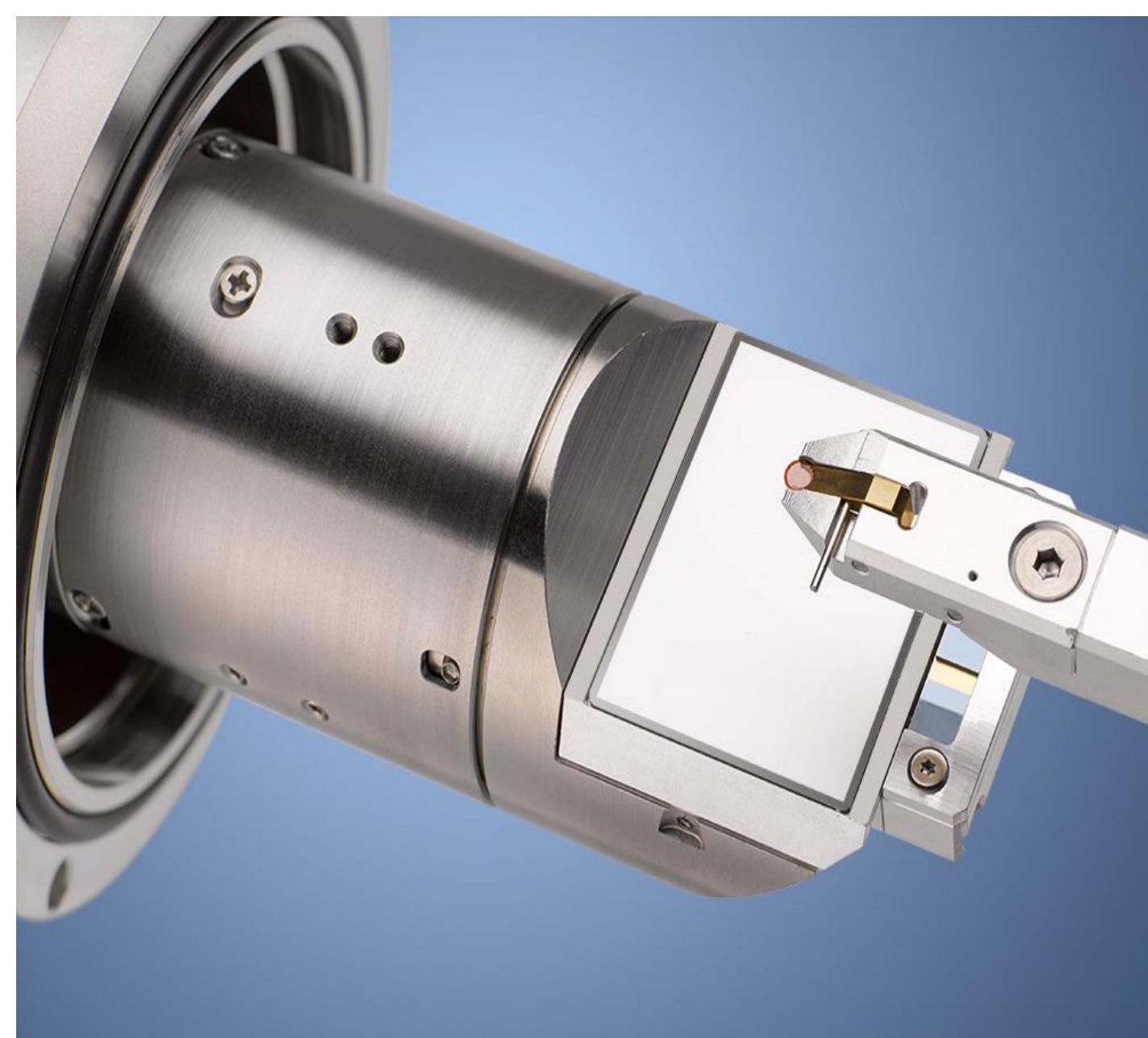
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INTRODUCTION

The primary goal of this study was to experimentally test the correlation between the relative thickness of a sample, and the size of the oversaturated area that was in the raw image produced by Transmission Kikuchi Diffraction (TKD).

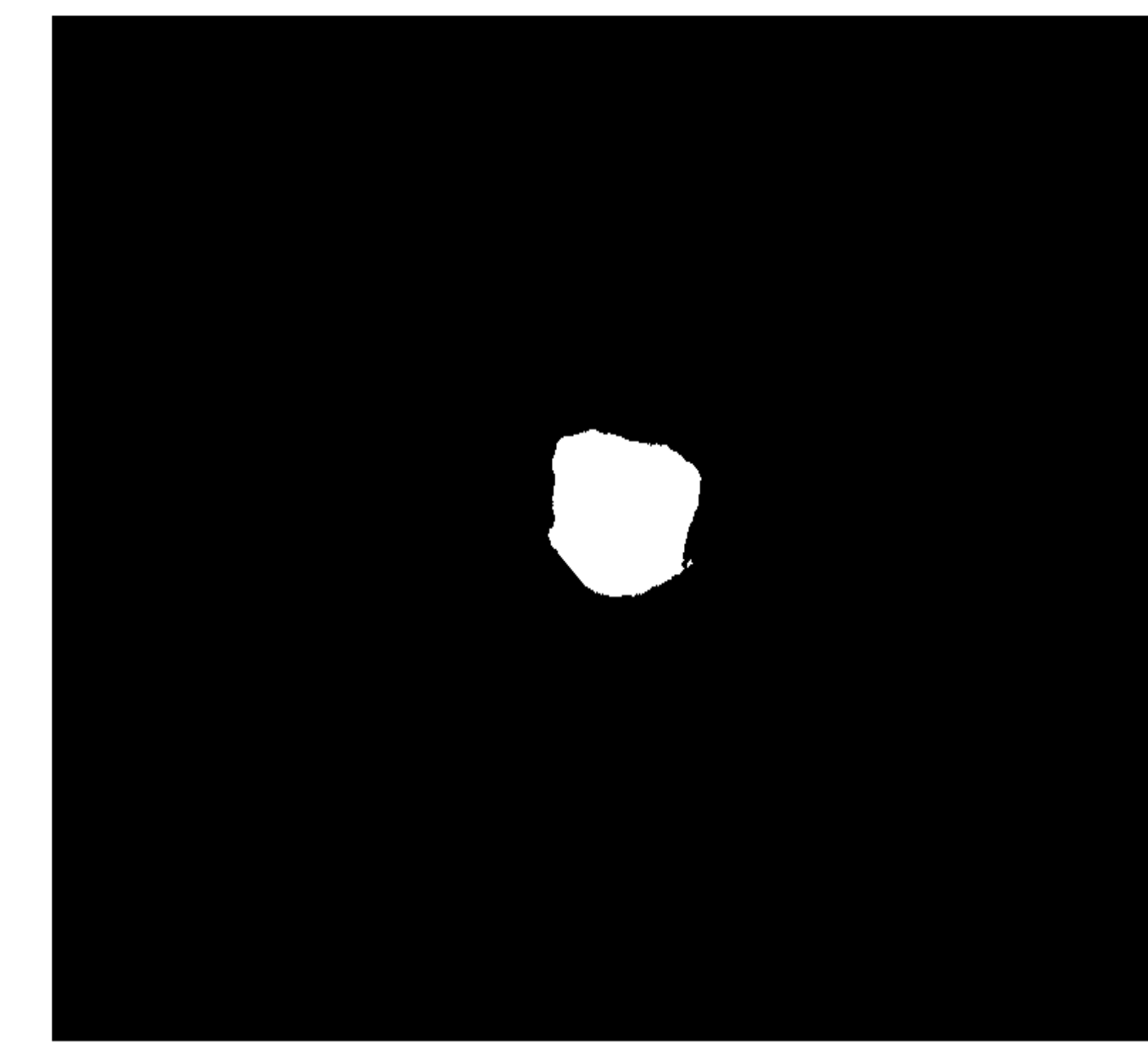
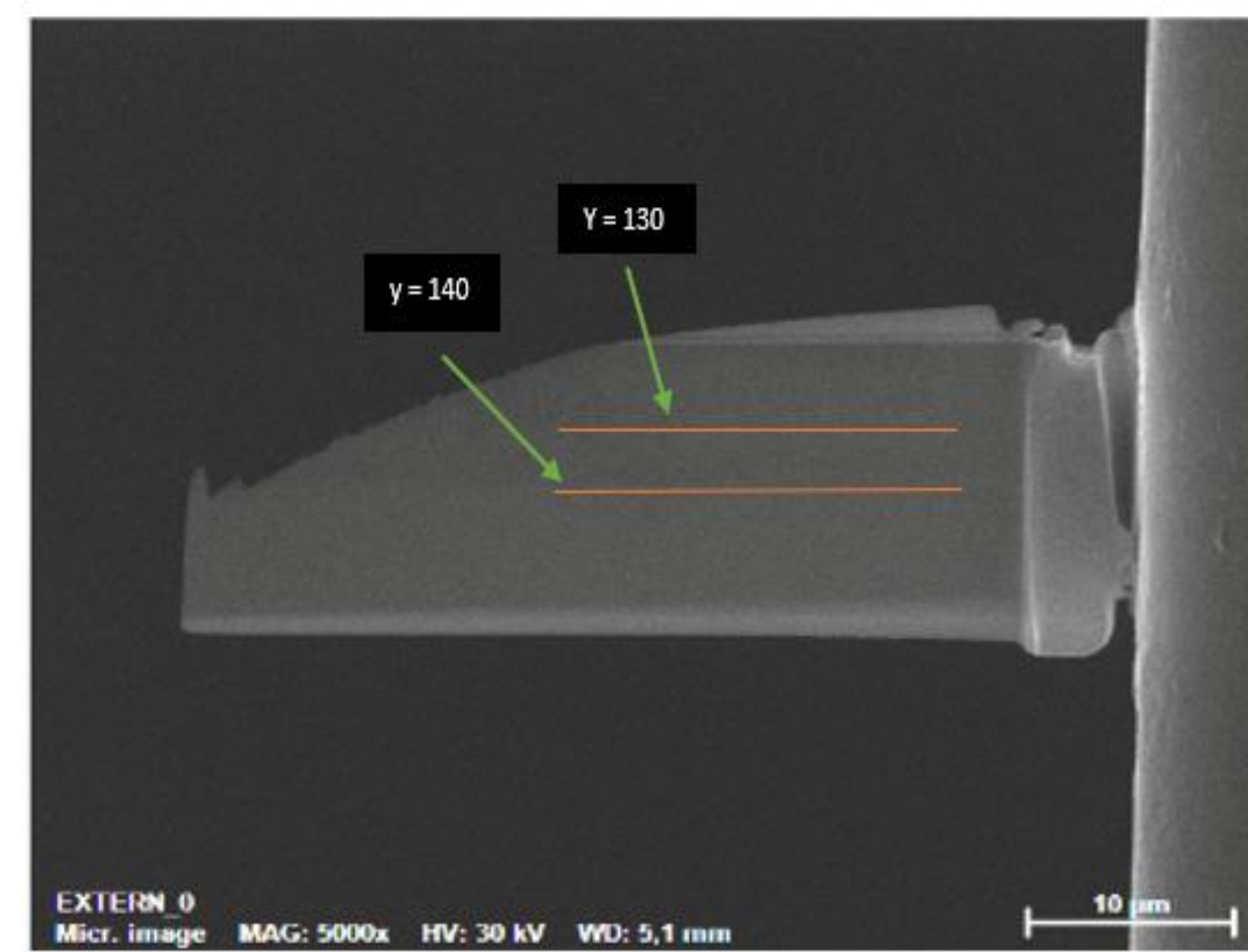
What is TKD

Transmission Kikuchi Diffraction is a technique used in electron microscopy that shines the primary beam of the electron microscope directly through the sample and has the collector plate below the sample. This is different from the conventional electron microscopy setup because the primary beam is traditionally diffracted off of the surface of the sample and then collected by the collector plate. The difference between the TKD microscope configuration (Above) and the traditional setup (Below) is depicted below.



METHOD

- Fabricated a silicon wedge lamella with a linear increase in thickness
- Created a TKD map of the entire silicon lamella
- Pictures of raw patterns produced by TKD were taken at horizontal increments of 5 pixels starting at $x = 100$ pixels to $x = 200$ pixels from the lamella
- The area measurements were then plotted against the pixel position that the raw image was taken at



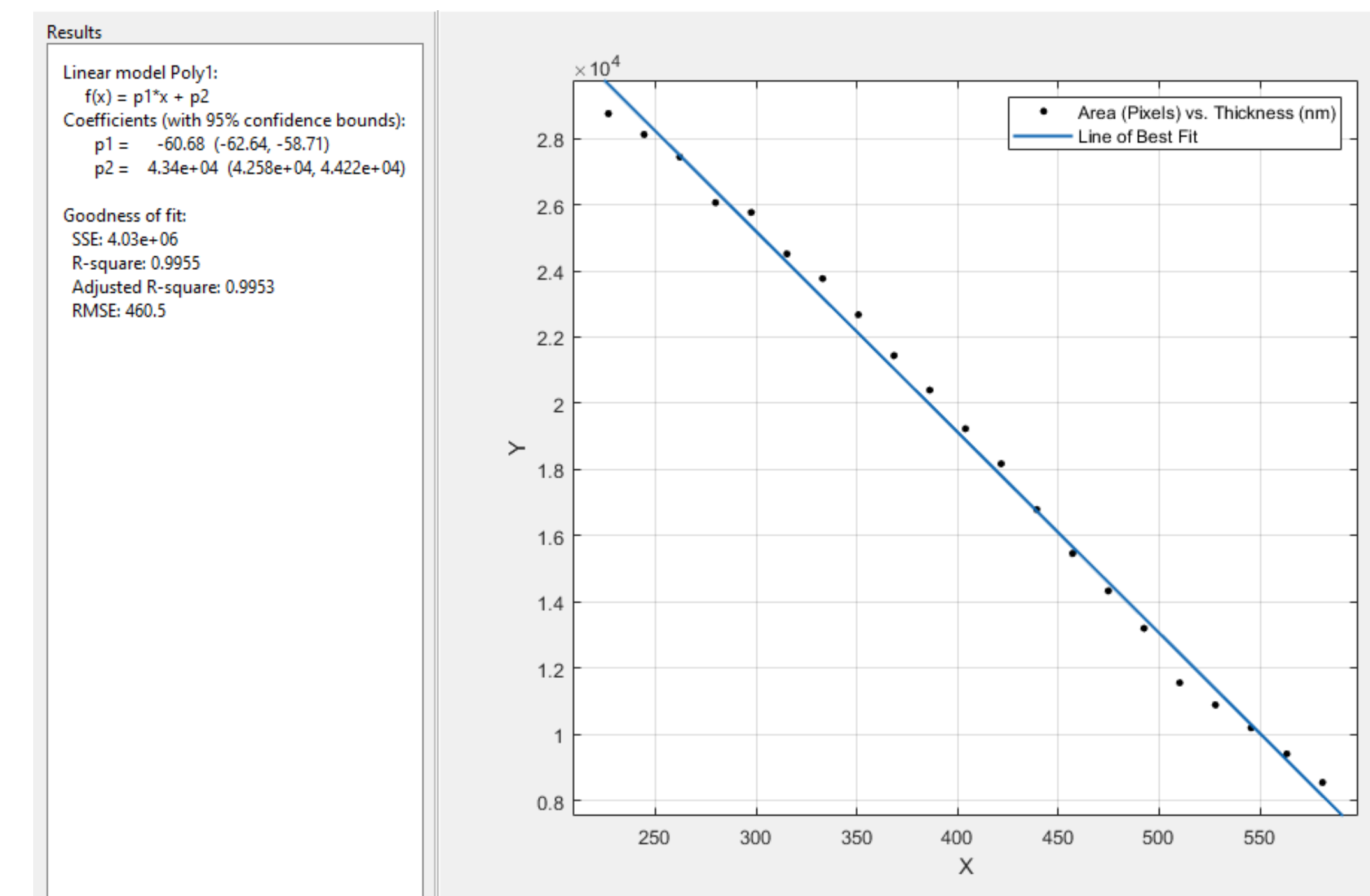
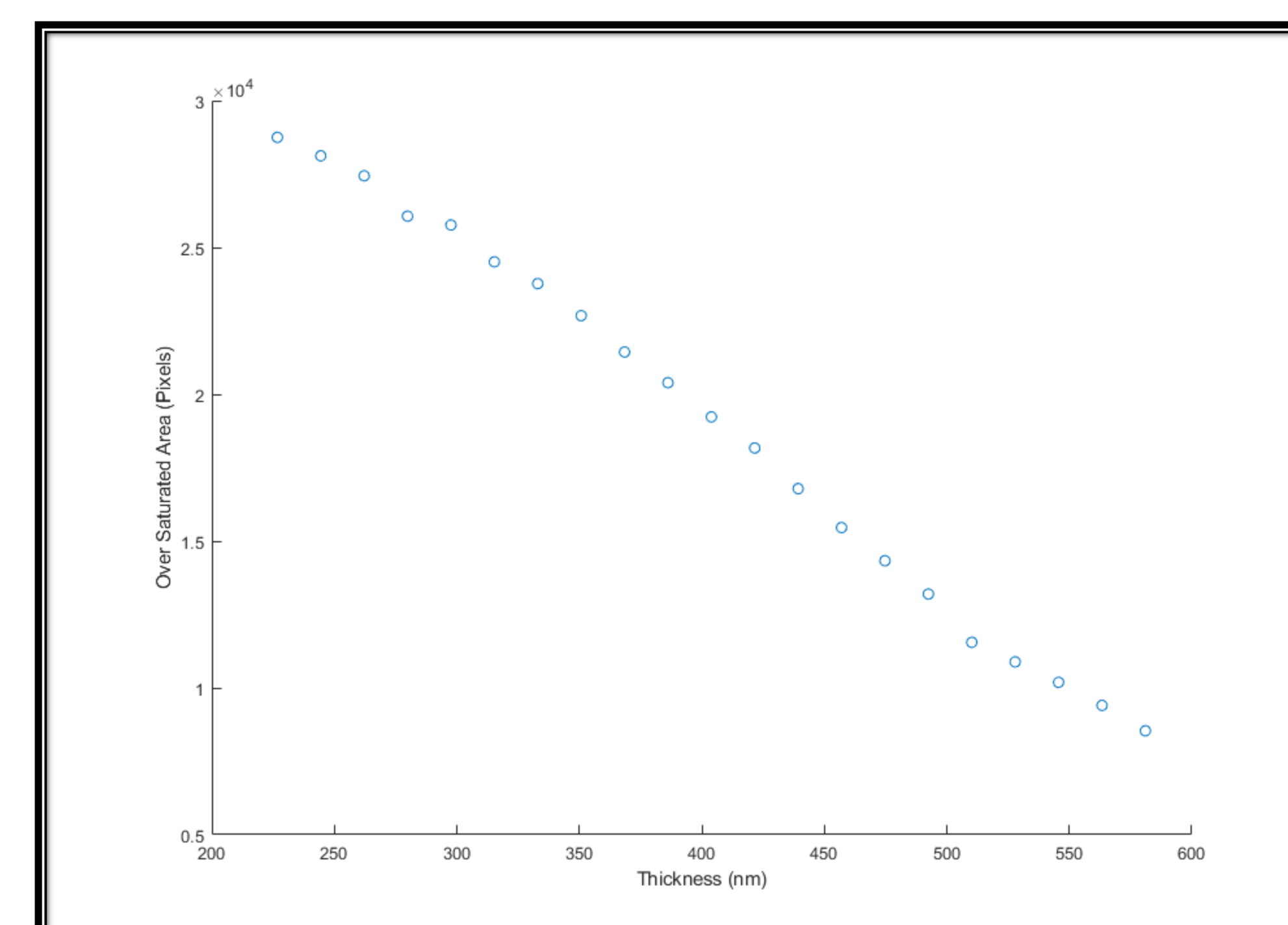
PURPOSE

The aim is to discover whether a relationship exists between the size of the oversaturated area in the raw images taken by the electron microscope to the thickness of a sample at the point where the raw image was taken; and if a relationship exists, to determine what type of relationship exists.

CONCLUSIONS

- A linear, negative relationship was found between the size of the oversaturated area in the raw images taken by the electron microscope and the thickness of a sample at the point where the raw image was taken
- Raw image data can be used to determine the relative thickness of a sample
- Possible future experiments to further verify these results may include varying the temperature and material of the sample.

RESULTS



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