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Scanning Electron Microscopy Laboratory Portfolio

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ESF
State University of New York
College of Environmental Science and Forestry

These images were prepared as part of the class MCR 484 Scanning Electron Microscopy at SUNY College of Environmental Science and Forestry, Fall 2016,

All images were acquired on the JEOL JSM 5800 LV Scanning Electron Microscope in the N. C. Brown Center for Ultrastructure Studies

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Major: Biotechnology

Minor: Microscopy

Career Goals: pHD in Microbiology– Studying infectious diseases

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The images found in this collection are examples of the knowledge and skills I have developed through the MCR 484 Scanning Electron Microscopy course taken in the fall of 2016.

I took this course because I believe it will benefit me greatly to be well versed in all types of microscopy before going forward with my career goals, especially because my interests are microscopic.

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The images I am presenting in this collection were chosen because they exemplify the knowledge and skills I have developed along with the care, quality, and concern for the work I produce.

Description of Images:

Figure 1: My Best Image

I have chosen this as my best image because it shows a preserved leaf sample after undergoing critical drying. The resolution is extremely good and there is no charging. There is great contrast in the tissues of the leaf.

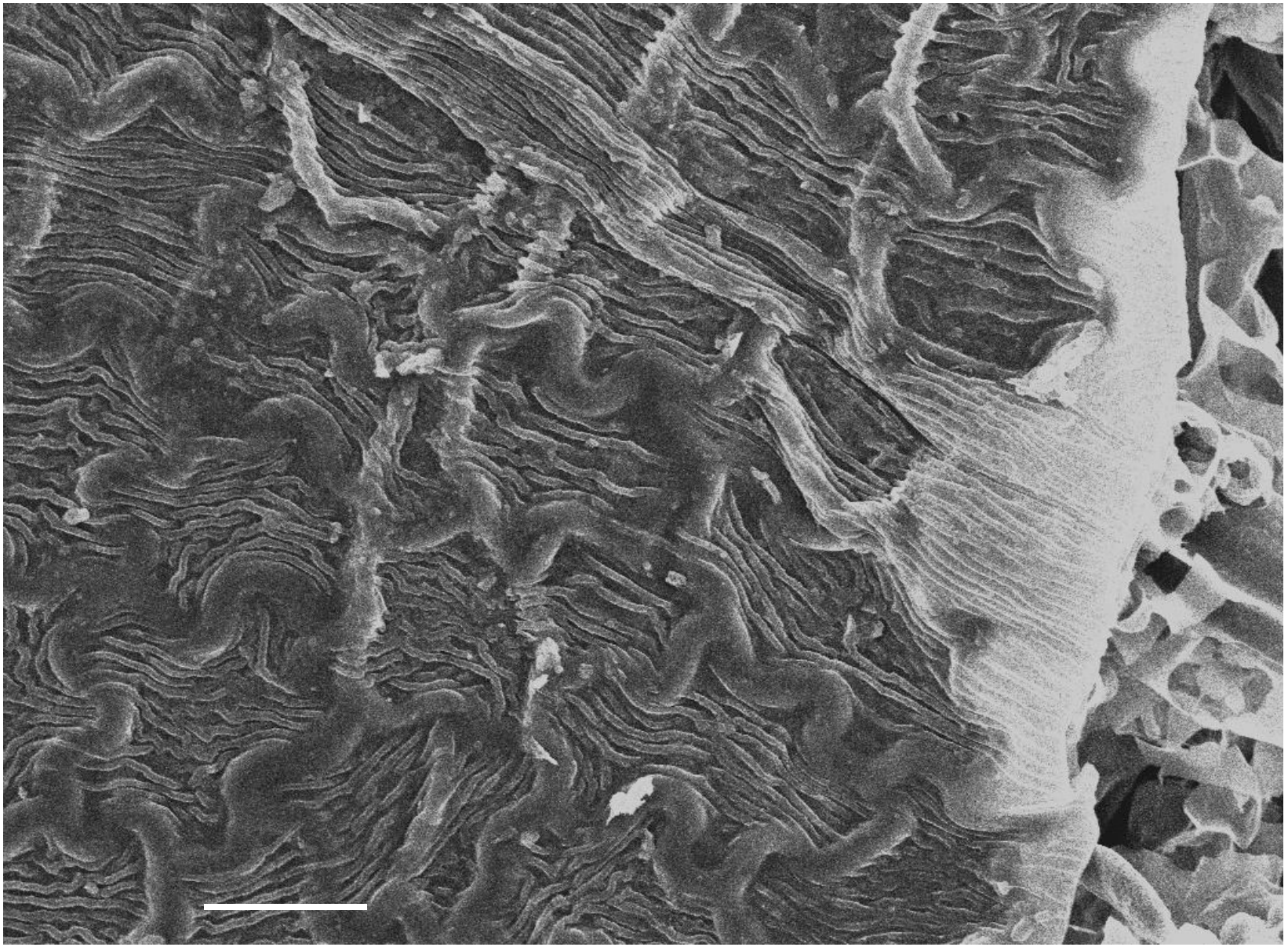


Figure 1: Scanning Electron micrograph of a critical dried leaf section for comparison on drying methods. Image was taken at a working distance of 20mm and an aperture of 2. The sample shows little damage to the leaf, showing that critical drying method is the more efficient method to use. SS 9, AV 15kV, Mag 800x Bar= 20um

Figure 2: The Hardest Image to Capture

I have chosen this the hardest image to capture because I had to continuously adjust brightness and contrast, change the spot size and balance the wobbler approximately 3 times, and fiddle with the working distance for over an hour

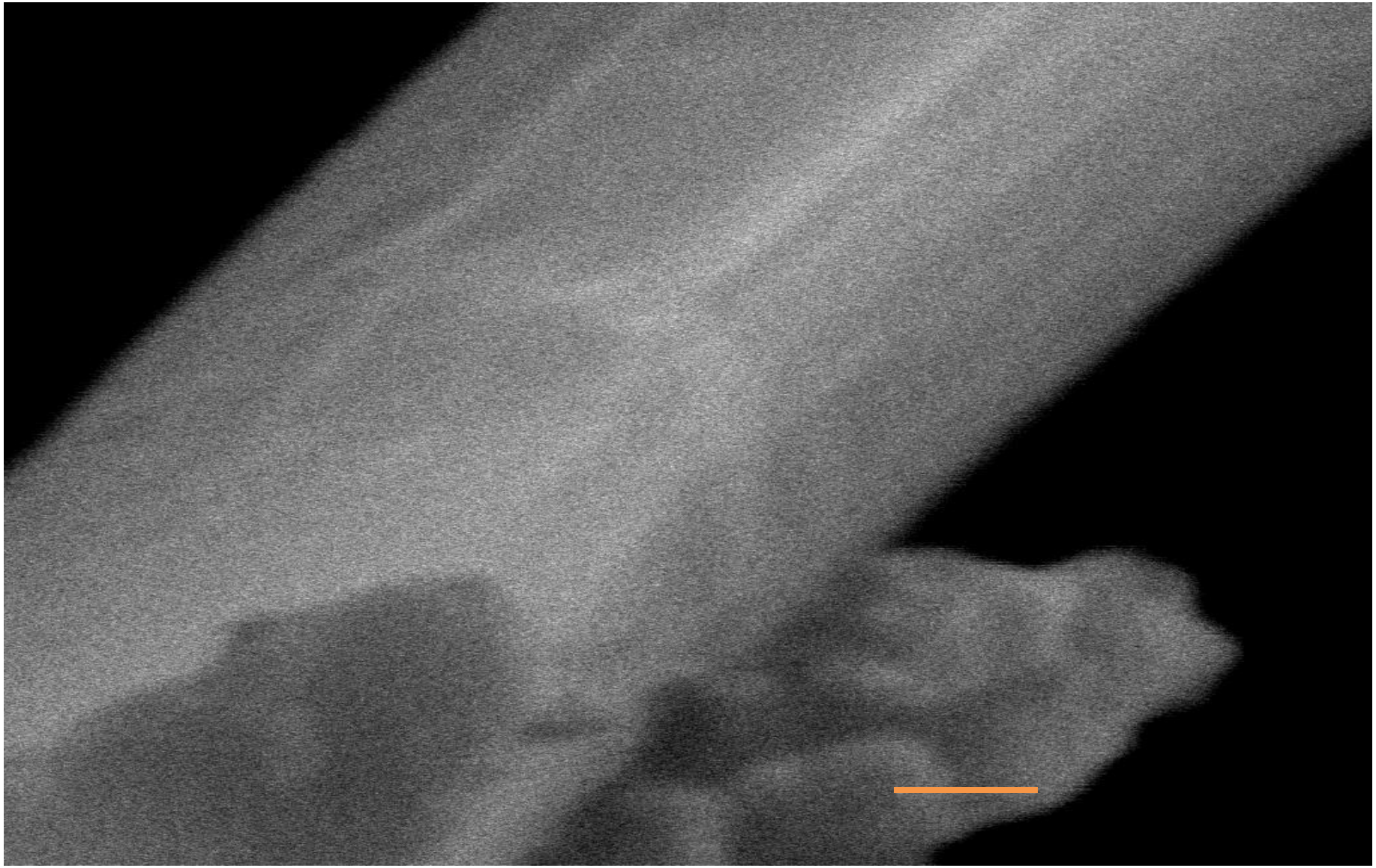


Figure 2. Hardest Image to Capture: SEI of a mite at 50,000x for comparison of increasing magnifications. Image was taken at a working distance of 11mm and an aperture of 1. This image has more surface detail and better contrast on the claw and leg. Charging has been almost eliminated, making the image look 3-D. The focus has shifted to the leg because the depth of field has decreased. SS 10, AV 20kV, Mag 50,000x Bar= 200nm

Figure 3: My Favorite Image

I have chosen this as my favorite because I decided to image it for fun after finishing a lab early and it turned out to be a cool looking image with great resolution, surface detail, and contrast

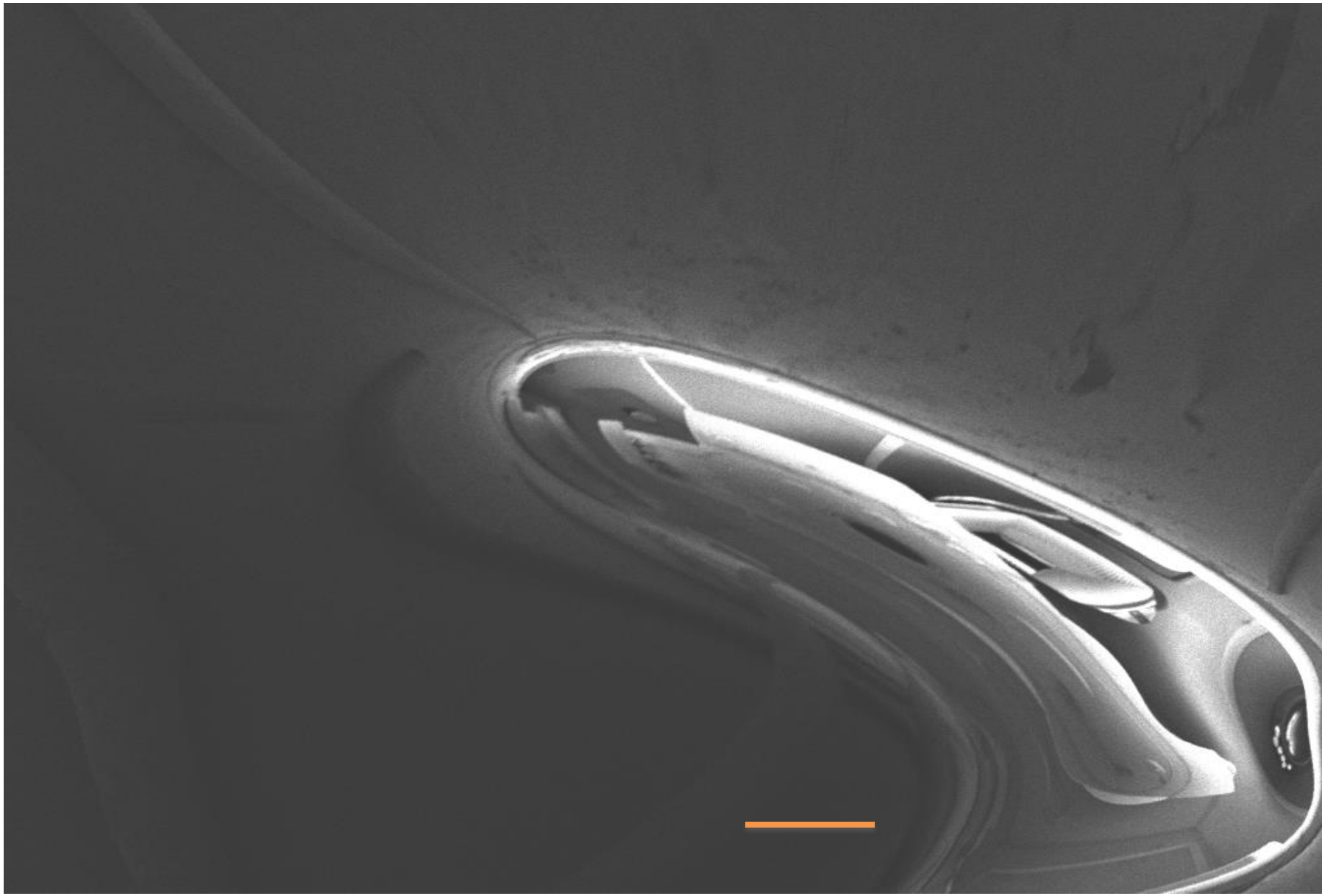


Figure 3. Favorite Image: : SEI of a monkey hair. Image was taken at a working distance of 15mm and an aperture of 2. This image shows a high detail hair follicle with an attached hair. The follicle has great surface detail, contrast, and resolution. The hair is slightly faint but still distinct from the background. SS 16, AV 0.8kV, Mag 65x Bar= 200nm

Additional Examples of My Work

The following images are additional examples of my work I have included them because I feel these images might be ones that could be published in a journal

Figure 4a/b: SEI of a mite body. Image was taken at a working distance of 11mm and an aperture of 1. These images show amazing contrast and surface detail of the mite. Each structure is extremely distinct and clear. The background is very dark, especially on the left, meaning there is very little charging. SS 10, AV 20.0 kV, Mag (left) 200x Mag (Right) 500x Bar= 20nm

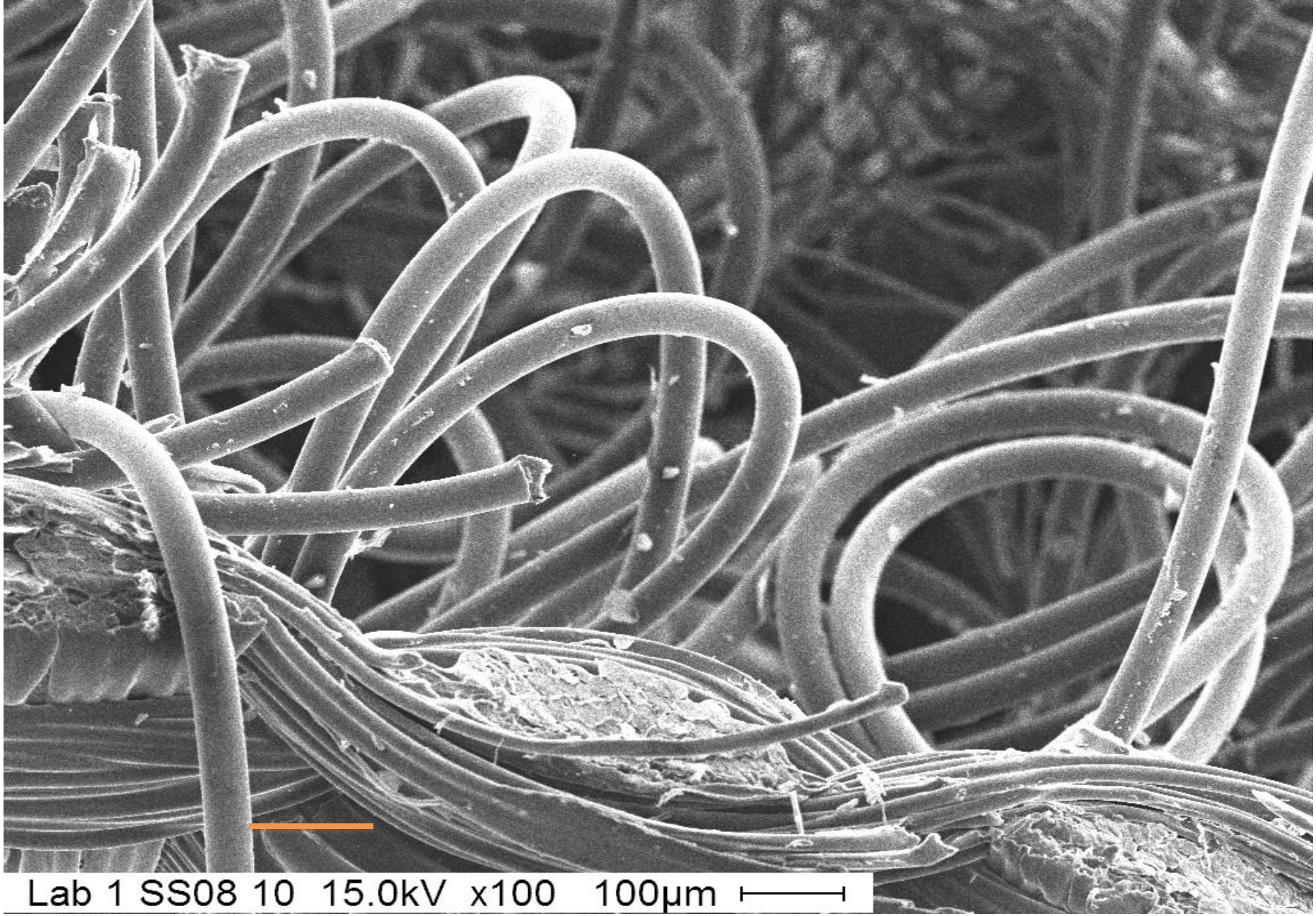


Figure 5a: SEI of a velcro. Image was taken at a working distance of 10mm and an aperture of 1. These images show amazing contrast and surface detail of the velcro. Each structure is extremely distinct and clear. The background is darker, especially on the right, meaning there is distinction between the background and foreground. SS 8, AV 15.0 kV, Mag 100x Bar= 100nm

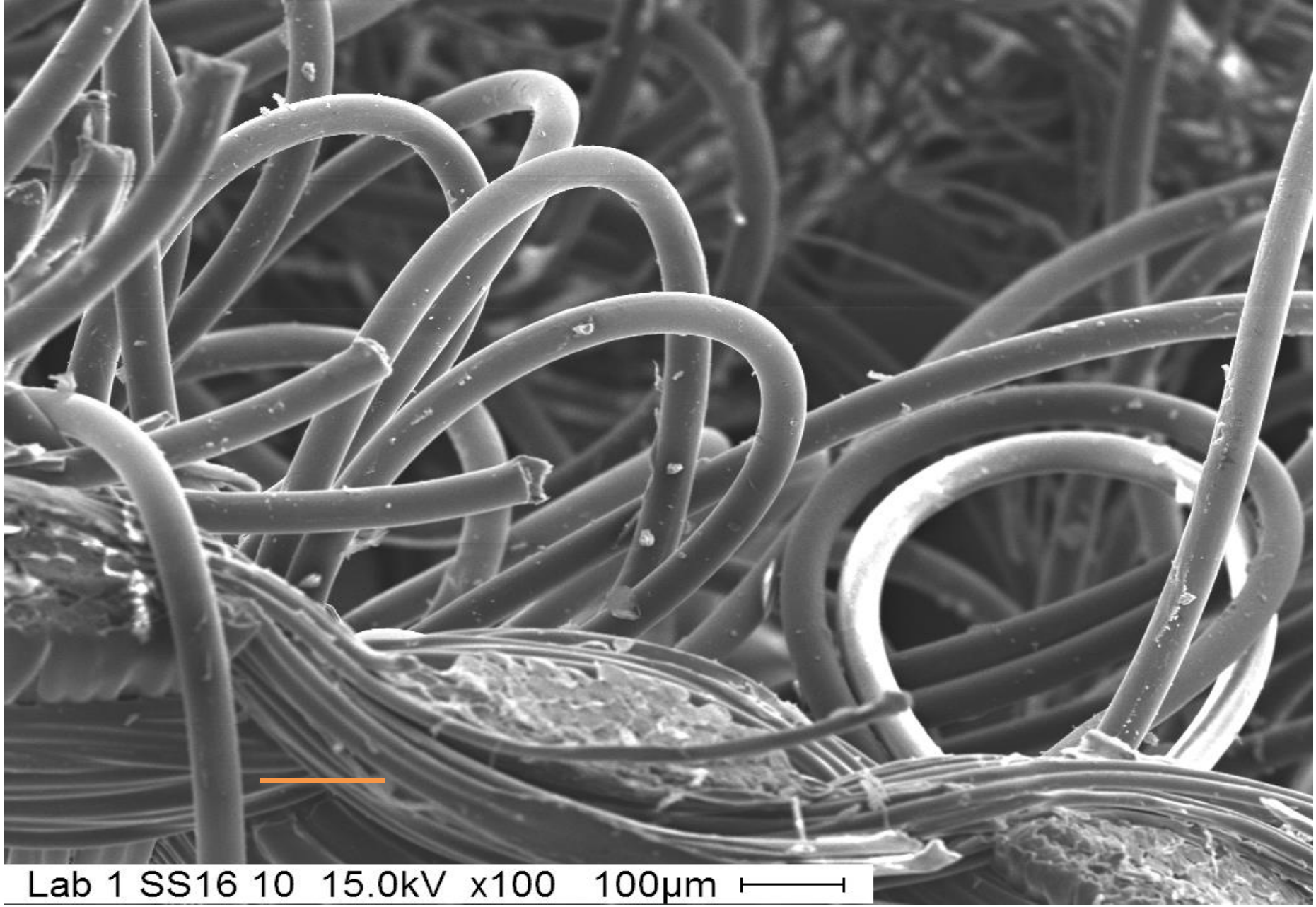
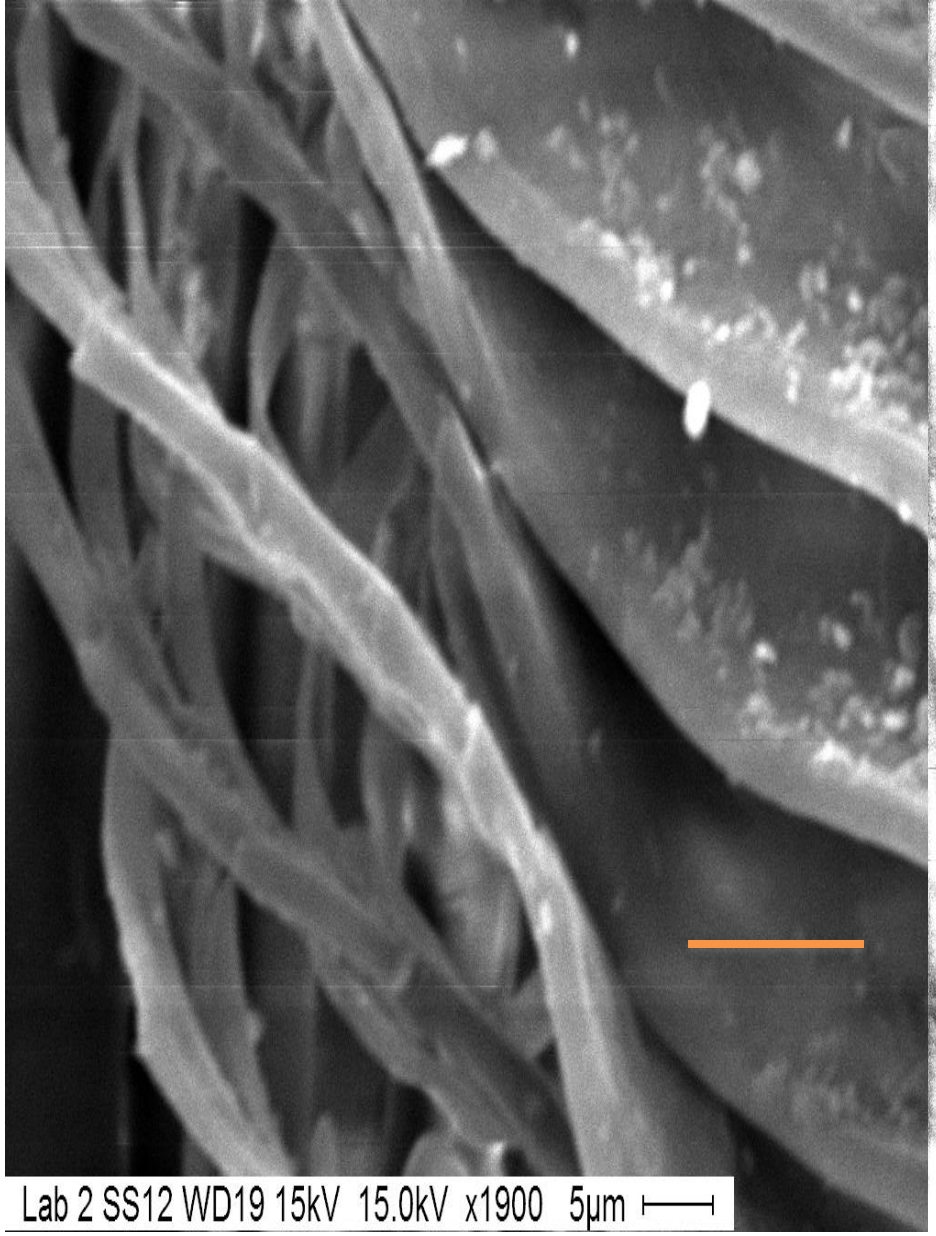


Figure 5b: SEI of velcro. Image was taken at a working distance of 10mm and an aperture of 1. These images show good contrast but less surface detail compared to the smaller spot size. Each structure is still distinct and clear. There is less edge effect. SS 16, AV 15.0 kV, Mag 100x Bar= 100nm



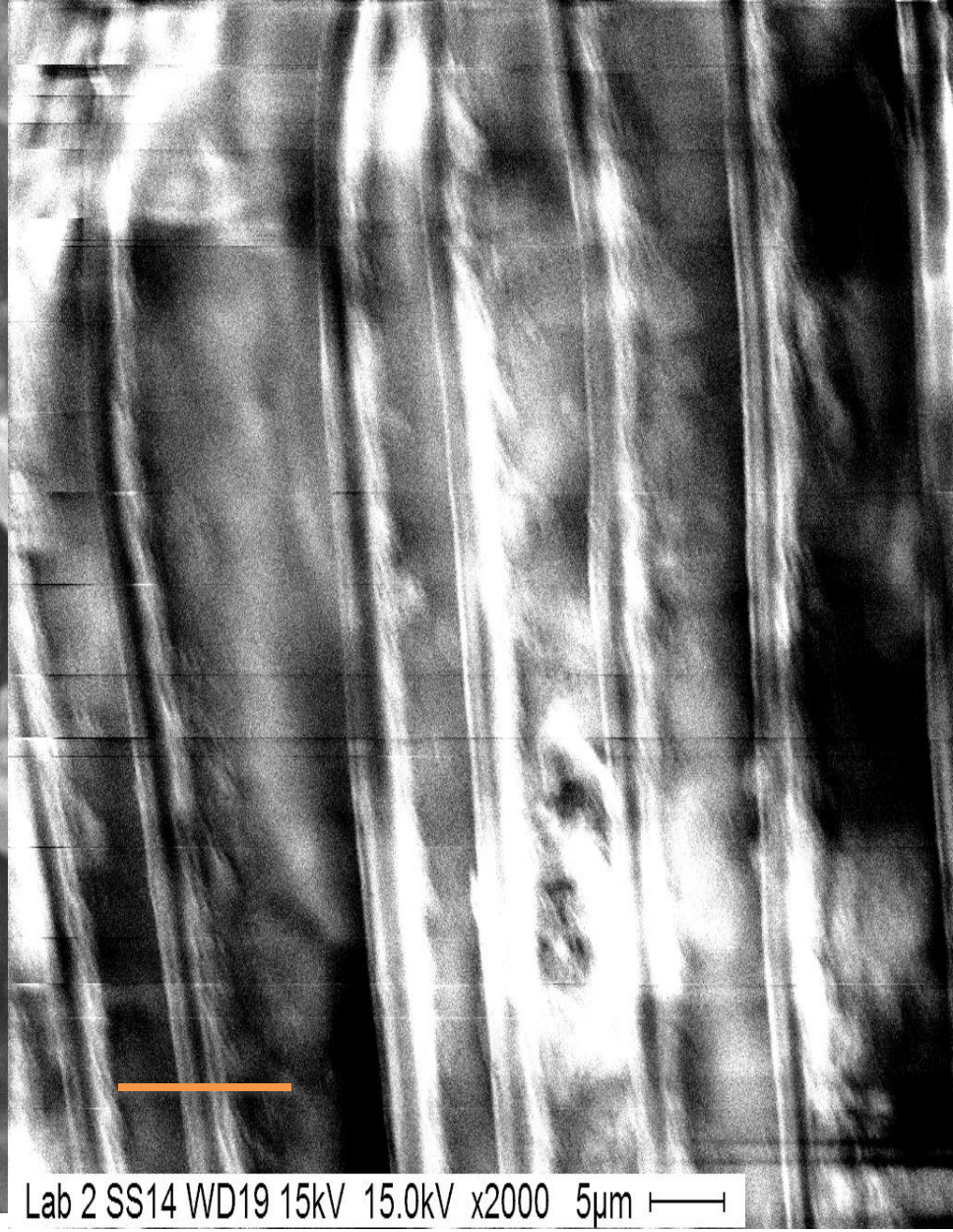


Figure 6a/b: SEI of a wing for sputter coating comparison. Image was taken at a working distance of 19mm and an aperture of 1. On the left (coated), there is very little charging , good overall contrast, and distinct surface details. On the right (uncoated) there is extreme charging, no surface detail, and an electric field has disrupted the image. SS 12 (a) 14(b), AV 15.0 kV, Mag (left) 1900x Mag (Right) 2000x Bar= 5nm

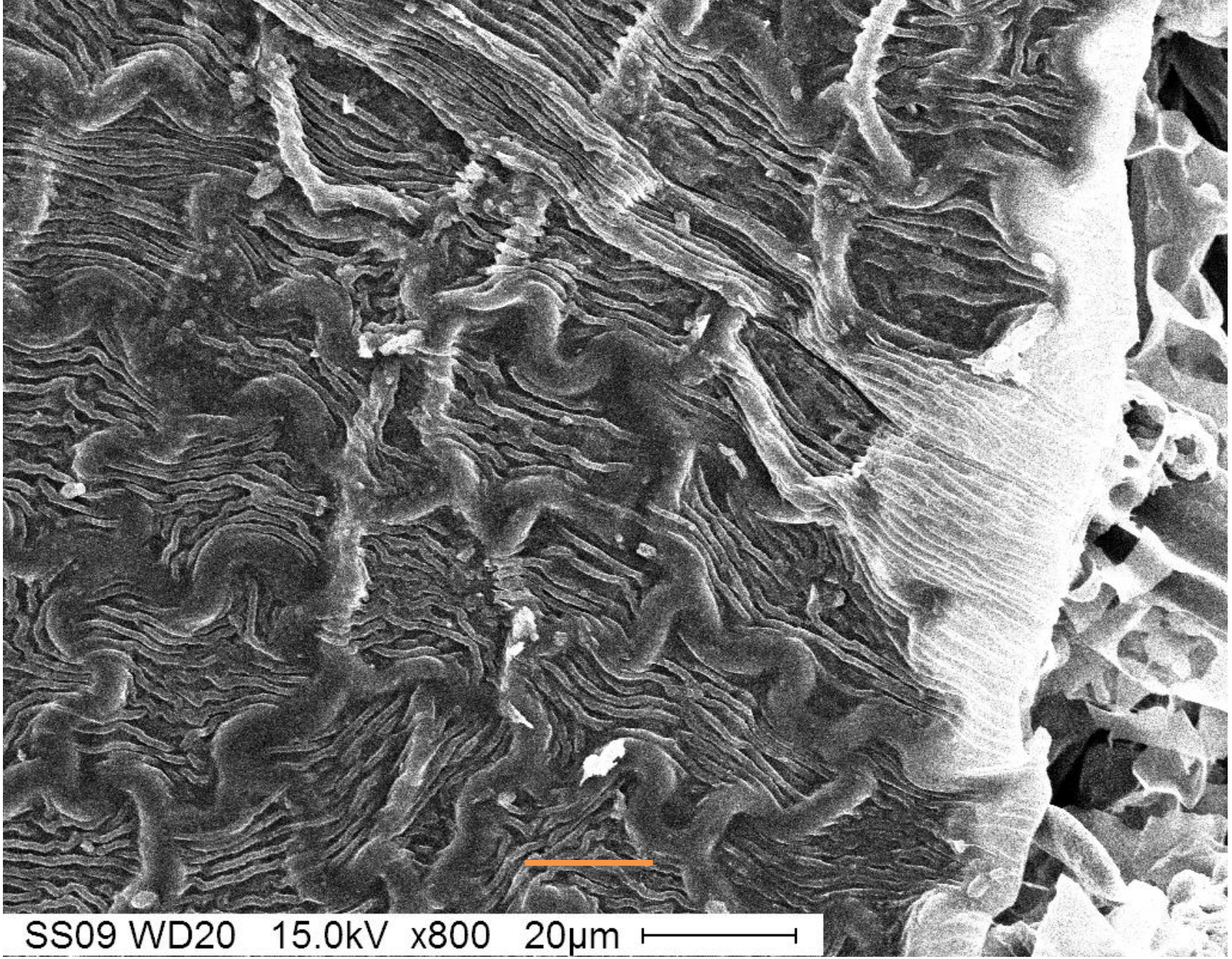


Figure 7: Scanning Electron micrograph of a critical dried leaf section for comparison on drying methods. Image was taken at a working distance of 20mm and an aperture of 2. The sample shows little damage to the leaf, showing that critical drying method is the more efficient method to use. SS 9, AV 15kV, Mag 800x Bar= 20um

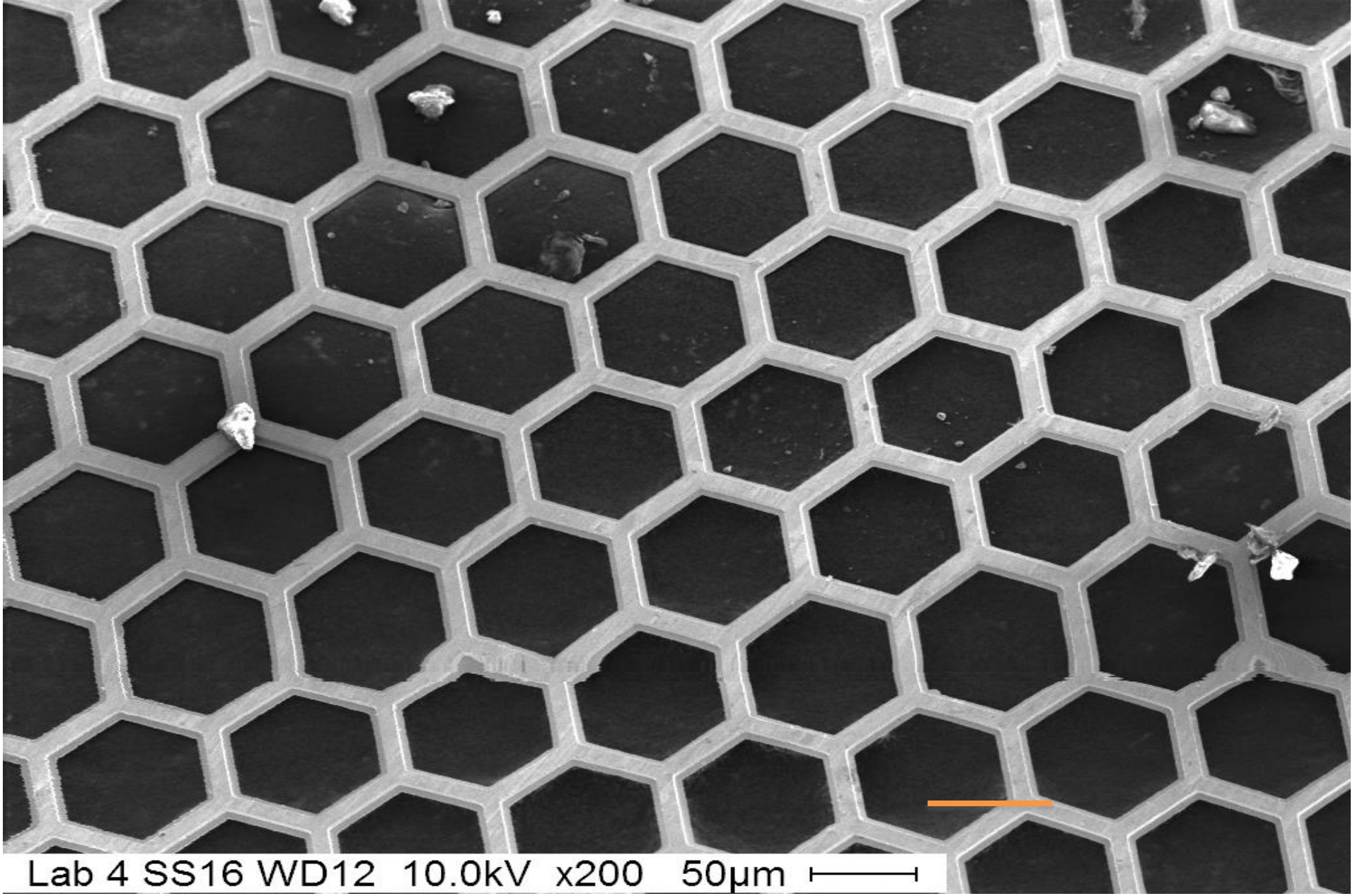


Figure 8a: Scanning Electron micrograph of a copper grid for comparison on depth of fields. Image was taken at a working distance of 12mm and an aperture of 2. The image shows more drastic distortion of the copper grid in the foreground and extreme fuzziness of particles in the background. Background also is streaked, showing contrast distortion. This depth of field is the worst. SS 16, AV 10kV, Mag 200x Bar= 50um

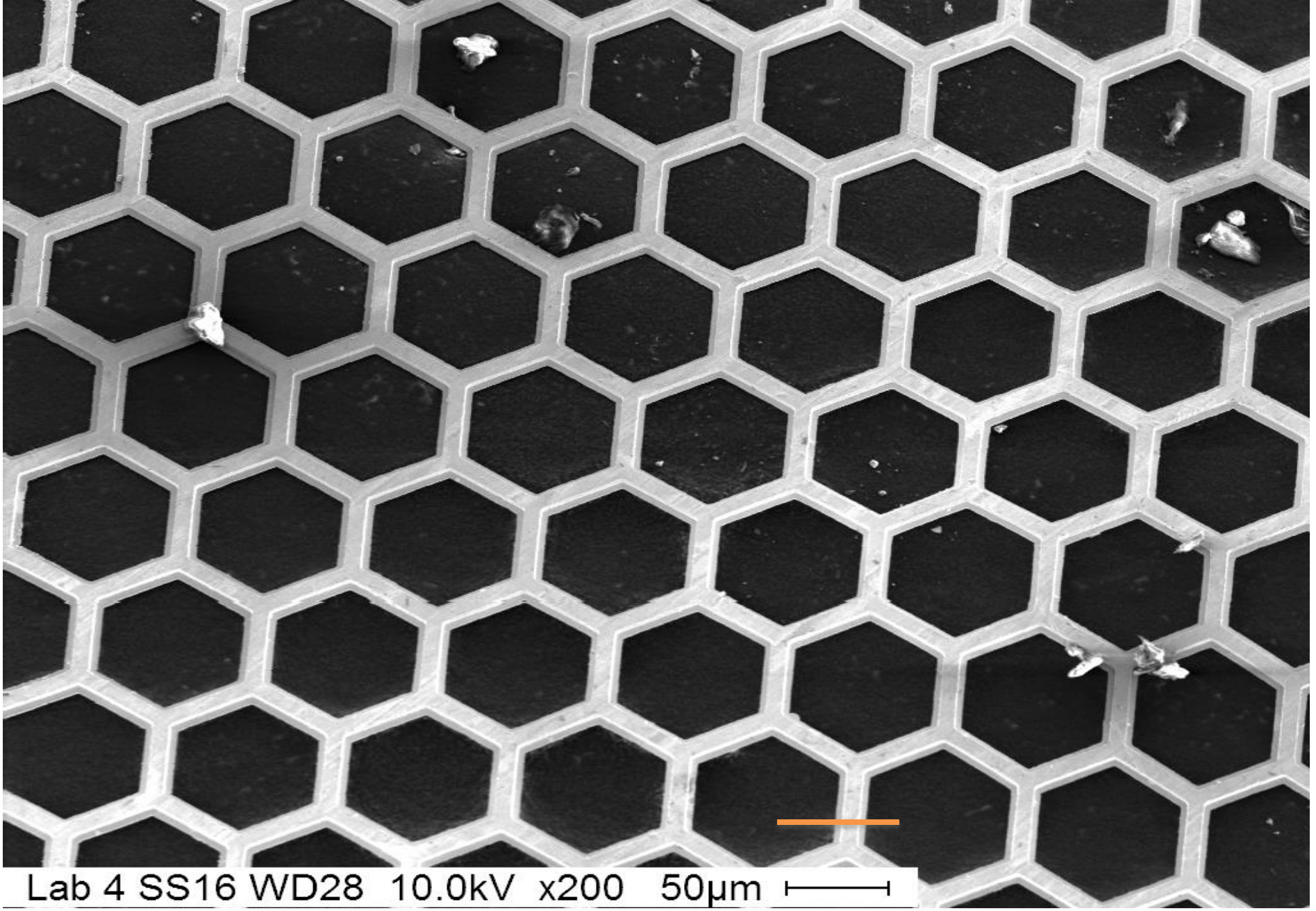


Figure 8b: Scanning Electron micrograph of a copper grid for comparison on depth of fields. Image was taken at a working distance of 29mm and an aperture of 1. The grid and dust particles in the foreground are very clear and particles in the background show little contrast distortion, making this the best working distance and aperture for depth of field. SS 16, AV 10kV, Mag 200x Bar= 50um

•Figure 9a: Scanning Electron micrograph of a fly head for comparison of accelerating voltages. Image was taken at a working distance of 20mm and an aperture of 1. The image shows good surface details and contrasting. Background and foreground resolution are clear and the sample has a 3-D look to it. Overcharging is present on the right side of the image. This accelerating voltage is best for looking at fine details of the sample. SS 10, AV 10kV, Mag 1500x Bar= 10

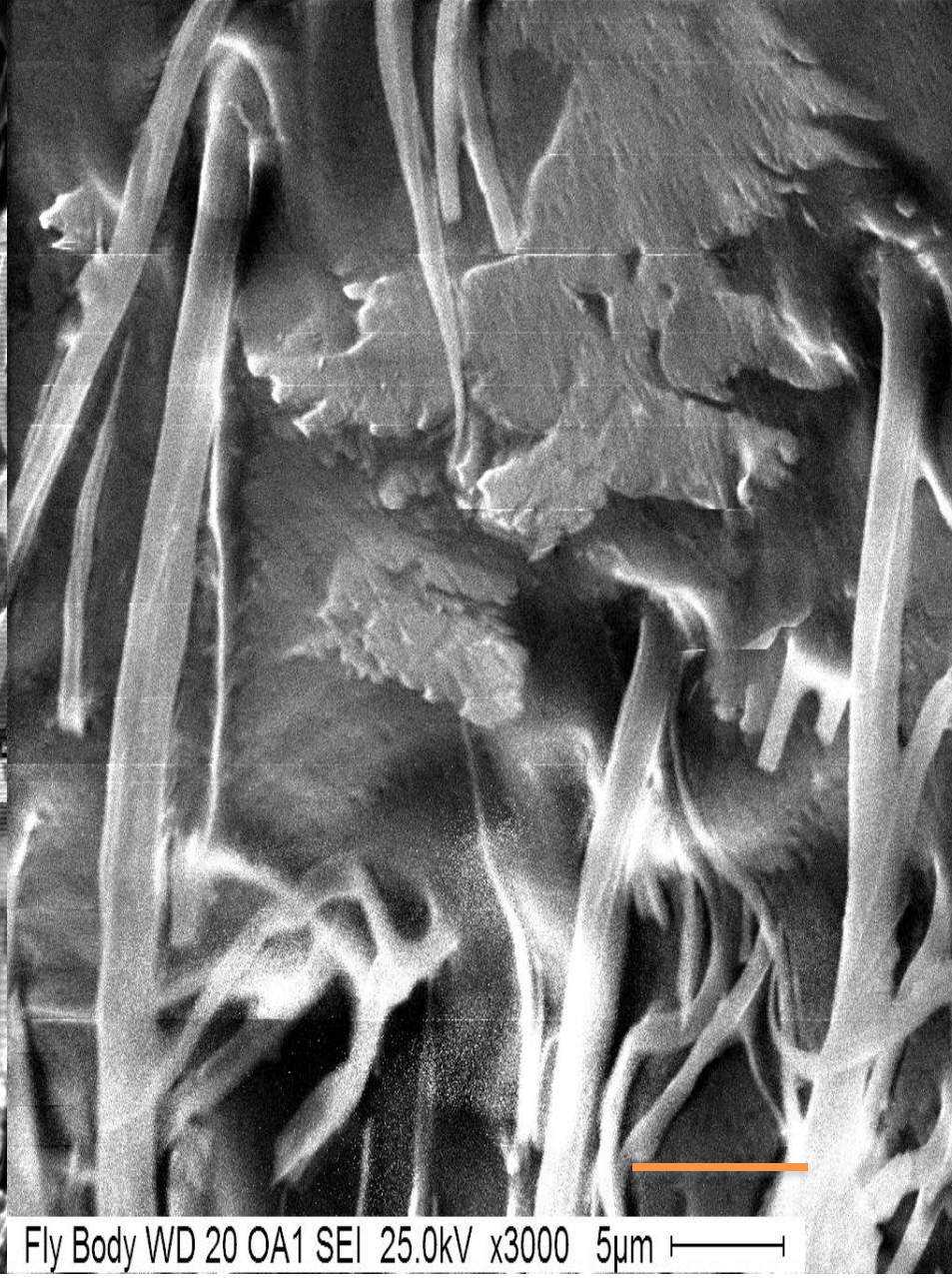


Figure 9b: Scanning Electron micrograph of a fly head for comparison of accelerating voltages. Image was taken at a working distance of 20mm and an aperture of 1. This image has extreme overcharging of sections of the head. There is a better edge effect on the top left and top right of the hair follicles. The follicles look 3-D near the tops. This image does not have good resolution in the background. This accelerating voltage is good for viewing 3-D structures of a

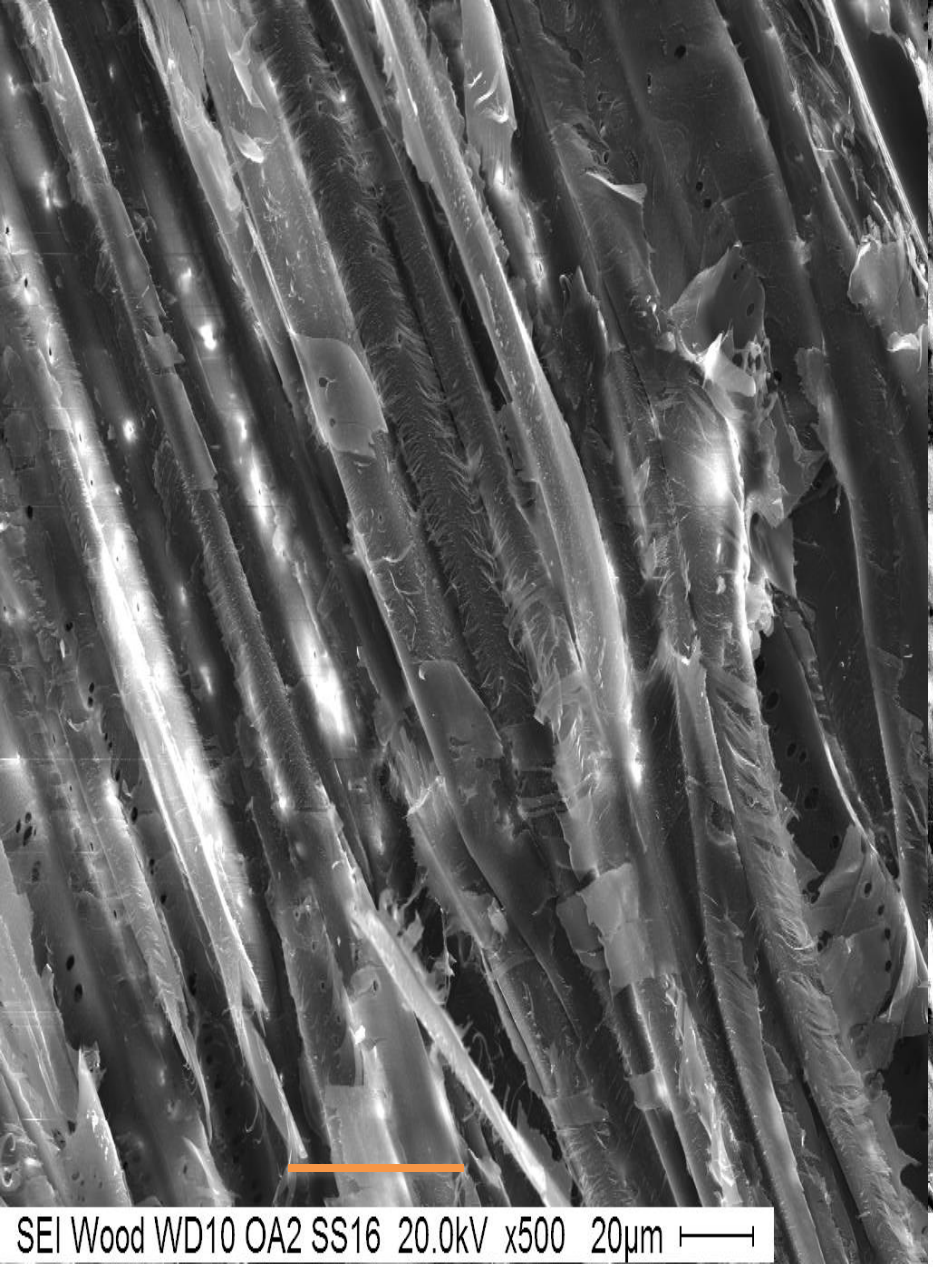


Figure 10a: BEI of a wood with salt crystals for comparison of BEI to SEI. Image was taken at a working distance of 10mm and an aperture of 2. This image has little to no resolution, surface detail, or contrast compared to the SEI. The image is also 2-D. However, the salt crystals, circled, are no longer charged and instead show up clearly in the BEI. SS 16, AV 20kV, Mag 500x Bar= 20um

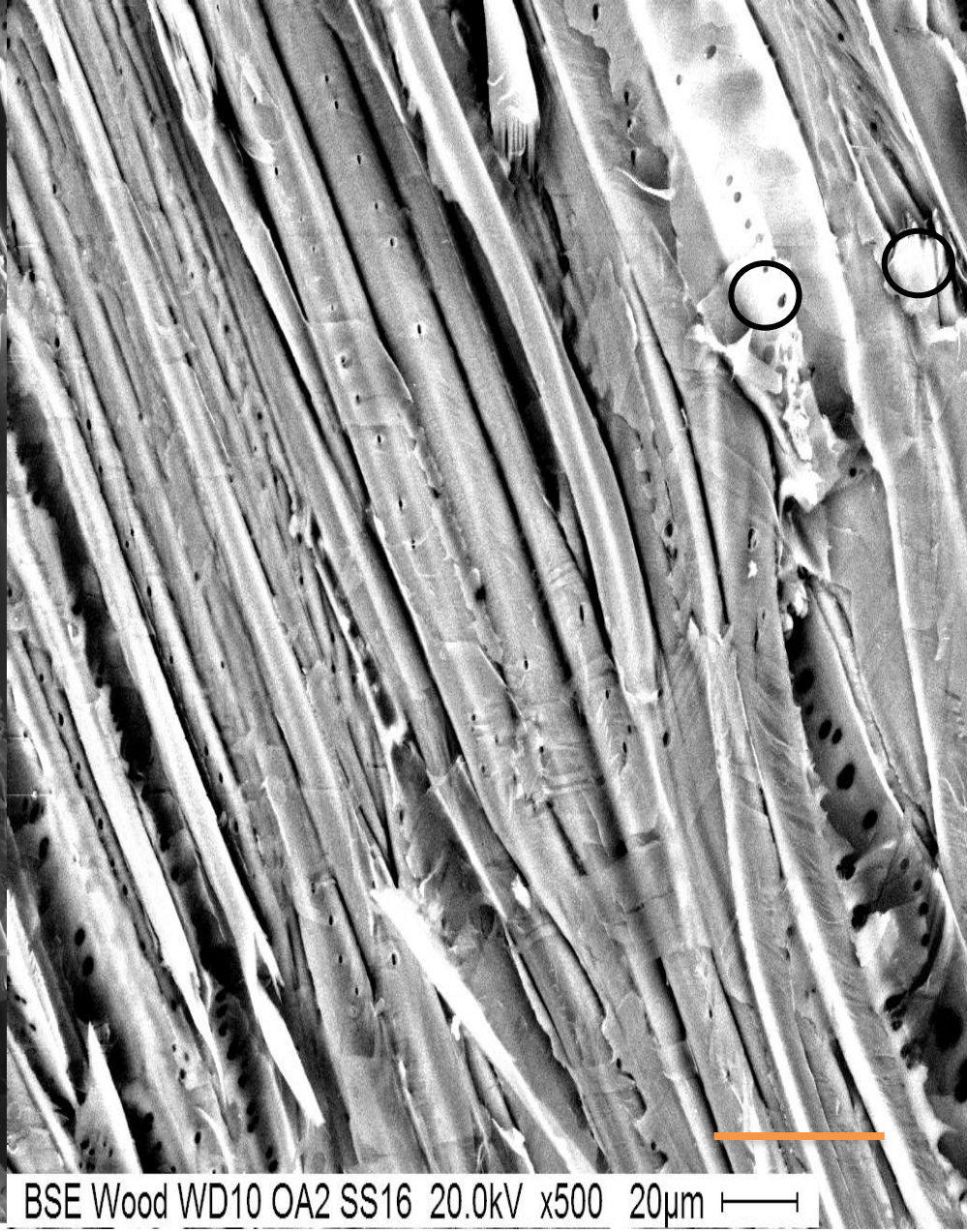


Figure 10b: BEI of a wood with salt crystals for comparison of BEI to SEI. Image was taken at a working distance of 10mm and an aperture of 2. This image has little to no resolution, surface detail, or contrast compared to the SEI. The image is also 2-D. However, the salt crystals, circled, are no longer charged and instead show up clearly in the BEI. SS 16, AV 20kV, Mag 500x Bar= 20um

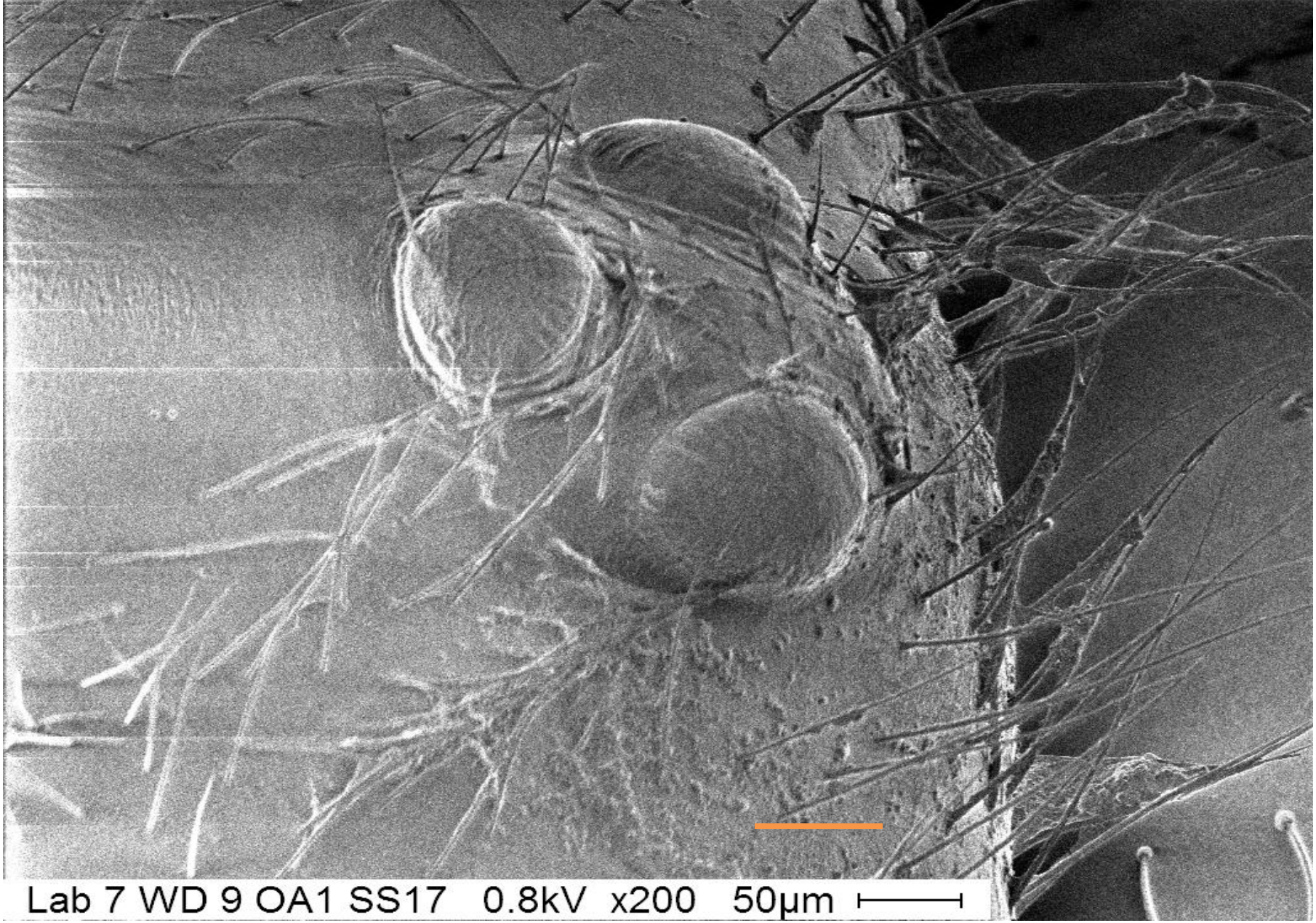


Figure 11: Scanning Electron micrograph of a fly head for low kV imaging of an uncoated sample. Image was taken at a working distance of 9mm and an aperture of 1. The image shows good surface details and very good contrasting. The image is not grainy in the foreground or background. Charging is present on the left side of the image and edge effect is present in the middle. This low accelerating voltage produced a very good image of the uncoated fly head and can be used for biological sample. SS 17 AV 0.8kV, Mag 200x Bar= 50um

Figure 12: SEI of a mite at 50,000x for comparison of increasing magnifications. Image was taken at a working distance of 11mm and an aperture of 1. This image has more surface detail and better contrast on the claw and leg. Charging has been almost eliminated, making the image look 3-D. The focus has shifted to the leg because the depth of field has decreased. SS 10, AV 20kV, Mag 50,000x Bar= 200nm

Figure 13: SEI of a mite at 50000x using Photoshop for correction on sharpness and contrast. Image has decreased brightness and increased contrast when compared to Image 8. The markings on the leg stand out more and the circles that compose the claw have more contrast between them. There is little to no change to sharpness, however. This image is more acceptable for publishing. . SS 10, AV 20kV, Mag 50,000x Bar= 200nm

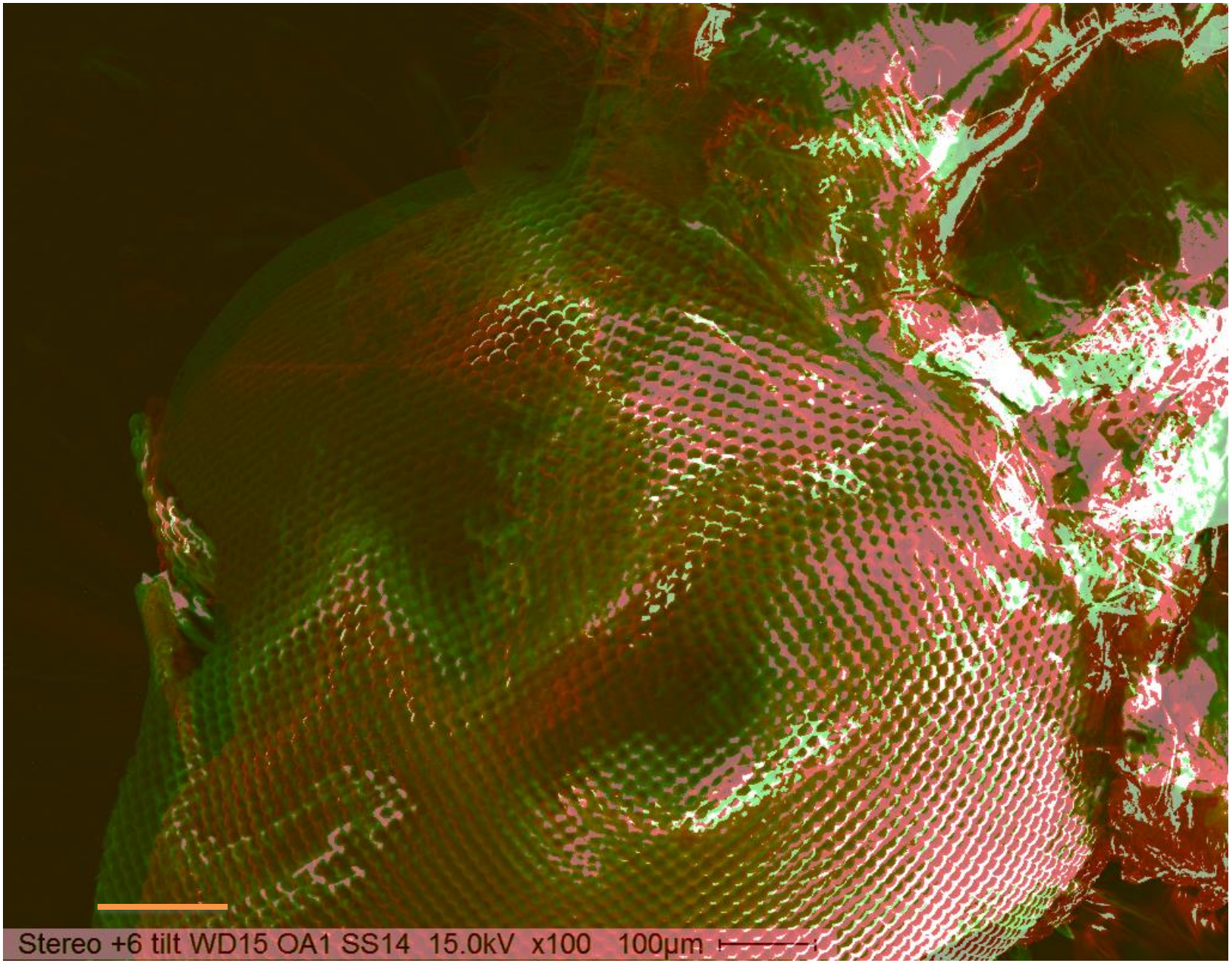


Figure 14: Merged red-green image of a wasp head to create a stereoimage. Image was taken at a working distance of 15mm and an aperture of 1. This image was successfully made 3-D by merging an image tilted at -6 degrees and an image tilted at 6 degrees together. There are distinct ridges and structures, as well as a downwards perspective. The foreground stands out against the background very well. SS 14, AV15V, Mag 100x Bar= 100µm