Claims

1. A method comprising: receiving a first image at a control unit, wherein the first image provides alignment information of an objective lens in a scanning electron microscope system; determining, using the control unit, a first X-Y voltage pair based on the first image, wherein the first X-Y voltage pair provides alignment of the objective lens closer to a center of an alignment target than in the first image, wherein determining the first X-Y voltage pair uses a first deep learning neural network, and wherein determining the first X-Y voltage pair using the first deep learning neural network includes classifying the first image based on a set of training images and generating the first X-Y voltage pair such that the first X-Y voltage pair falls on a coarse grid point from the training images; communicating, using the control unit, the first X-Y voltage pair to the scanning electron microscope system; receiving a second image at the control unit, wherein the second image provides alignment information of the objective lens and the second image is a result of settings of the first X-Y voltage pair; determining, using the control unit, a second X-Y voltage pair based on the second image, wherein the second X-Y voltage pair provides alignment of the objective lens closer to the center of the alignment target than the first X-Y voltage pair, and wherein determining the second X-Y voltage pair uses a second deep learning neural network; and communicating, using the control unit, the second X-Y voltage pair to the scanning electron microscope system.

2. The method of claim 1, wherein the first X-Y voltage pair is one class.

3. The method of claim 1, wherein the second X-Y voltage pair is a continuous value.

4. The method of claim 1, wherein the second X-Y voltage pair is based on an average of a plurality of results.

5. The method of claim 1, further comprising: applying the first X-Y voltage pair to a Q4 lens of the scanning electron microscope before generating the second image; and applying the second X-Y voltage pair to the Q4 lens of the scanning electron microscope.

6. The method of claim 1, wherein the first deep learning neural network includes a classification network.

7. The method of claim 1, wherein the second deep learning neural network includes a regression network ensemble.

8. The method of claim 1, wherein the first image and the second image are of a carbon substrate with gold-plated tin spheres on the carbon substrate.

9. The method of claim 1, wherein the first X-Y voltage pair corresponds to an X coordinate and a Y coordinate of a center of an in-focus area of the first image.

10. The method of claim 1, wherein determining the second X-Y voltage pair using the second deep learning neural network includes classifying the second image based on the set of training images and generating the second X-Y voltage pair such that the second X-Y voltage pair falls on a coarse grid point from the training images.

11. A non-transitory computer readable medium storing a program configured to instruct a processor to: receive a first image, wherein the first image provides alignment information of an objective lens in a scanning electron microscope system; determine a first X-Y voltage pair based on the first image, wherein the first X-Y voltage pair provides alignment of the objective lens closer to a center of an alignment target than in the first image, wherein determining the first X-Y voltage pair uses a first deep learning neural network, and wherein determining the first X-Y voltage pair using the first deep learning neural network includes classifying the first image based on a set of training images and generating the first X-Y voltage pair such that the first X-Y voltage pair falls on a coarse grid point from the training images; communicate the first X-Y voltage pair; receive a second image, wherein the second image provides alignment information of the objective lens and the second image is a result of settings of the first X-Y voltage pair; determine a second X-Y voltage pair based on the second image, wherein the second X-Y voltage pair provides alignment of the objective lens closer to the center of the alignment target than the first X-Y voltage pair, and wherein determining the second X-Y voltage pair uses a second deep learning neural network; and communicate the second X-Y voltage pair.

12. The non-transitory computer readable medium of claim 11, wherein the first X-Y voltage pair is one class.

13. The non-transitory computer readable medium of claim 11, wherein the second X-Y voltage pair is a continuous value.

14. The non-transitory computer readable medium of claim 11, wherein the second X-Y voltage pair is based on an average of a plurality of results.

15. The non-transitory computer readable medium of claim 11, wherein the first deep learning neural network includes a classification network.

16. The non-transitory computer readable medium of claim 11, wherein the second deep learning neural network includes a regression network ensemble.

17. The non-transitory computer readable medium of claim 11, wherein the first X-Y voltage pair and the second X-Y voltage pair are communicated to the scanning electron microscope system.

18. A system comprising: a control unit including a processor, a memory, and a communication port in electronic communication with a scanning electron microscope system, wherein the control unit is configured to: receive a first image, wherein the first image provides alignment information of an objective lens in the scanning electron microscope; determine a first X-Y voltage pair based on the first image using a first deep learning neural network, wherein the first X-Y voltage pair provides alignment of the objective lens closer to a center of an alignment target than in the first image, and wherein determining the first X-Y voltage pair using the first deep learning neural network includes classifying the first image based on a set of training images and generating the first X-Y voltage pair such that the first X-Y voltage pair falls on a coarse grid point from the training images; communicate the first X-Y voltage pair to the scanning electron microscope system; receive a second image, wherein the second image provides alignment information of the objective lens and the second image is a result of settings of the first X-Y

voltage pair; determine a second X-Y voltage pair based on the second image using a second deep learning neural network, wherein the second X-Y voltage pair provides alignment of the objective lens closer to the center of the alignment target than the first X-Y voltage pair; and communicate the second X-Y voltage pair to the scanning electron microscope system.

19. The system of claim 18, further comprising an electron beam source, an electron optical column having a Q4 lens and the objective lens, and a detector, wherein the control unit is in electronic communication with the Q4 lens and the detector.

20. The system of claim 18, wherein the first image and the second image are of a carbon substrate with gold-plate tin spheres on the carbon substrate.