Claims

1. An apparatus, comprising: an electron source; a beamlet control mechanism configured to produce a plurality of beamlets utilizing electrons provided by the electron source, the beamlet control mechanism further configured to deliver one of the plurality of beamlets toward a target at a time-instance, wherein the beamlet control mechanism comprises at least one of an aperture plate, an aperture array, or one or more blanking devices; and a detector configured to produce an image of the target at least partially based on electrons backscattered out of the target, wherein the detector is further configured to receive electrons backscattered out of the target for two or more beamlets delivered toward the target at two or more time-instances, wherein the detector is further configured to produce the image of the target at least partially based on a sum of the received backscattered electrons.

2. The apparatus of claim 1, wherein the beamlet control mechanism comprises a single aperture plate movable relative to a multi-beam aperture array, wherein an alignment of the single aperture plate and one of an array of apertures defined on the multi-beam aperture array is utilized to deliver one of the plurality of beamlets toward the target.

3. The apparatus of claim 1, wherein the beamlet control mechanism comprises an array of blanking devices defined to correspond to an array of apertures defined on a multi-beam aperture array, wherein selective engagement and disengagement of the array of blanking devices is utilized to deliver one of the plurality of beamlets toward the target.

4. The apparatus of claim 1, wherein the beamlet control mechanism comprises a multi-beam aperture array with a blanking device incorporated within each aperture defined on the multi-beam aperture array.

5. The apparatus of claim 1, wherein the image of the target includes a backscattered electrons (BSE) image of the target.

6. The apparatus of claim 1, further comprising: an energy filter configured to selectively block the detector from receiving secondary electrons generated when one of the plurality of beamlets is delivered to the target.

7. The apparatus of claim 6, wherein the energy filter is configured to block all except for the highest energy backscattered electrons from reaching the detector.

8. The apparatus of claim 6, wherein the energy filter includes an energy filter array.

9. The apparatus of claim 6, wherein the energy filter includes a large area global energy filter.

10. The apparatus of claim 1, wherein the detector includes an array of detectors corresponding to the plurality of beamlets.

11. The apparatus of claim 1, further comprising: at least one lens positioned between the electron source and the beamlet control mechanism, the at least one lens configured to focus the electrons provided by the electron source onto the beamlet control mechanism.

12. The apparatus of claim 1, further comprising: at least one deflector or lens configured to converge one or more of the plurality of beamlets to a single point on the target.

13. An apparatus, comprising: an electron source; a beamlet control mechanism configured to produce a plurality of beamlets utilizing electrons provided by the electron source, the beamlet control mechanism further configured to deliver one of the plurality of beamlets toward a target at a time instance; and an array of detectors corresponding to the plurality of beamlets, the array of detectors configured to produce an image of the target at least partially based on electrons backscattered out of the target, wherein the array of detectors is further configured to receive electrons backscattered out of the target for two or more beamlets delivered toward the target at two or more time-instances, wherein the detector is further configured to produce the image of the target at least partially based on a sum of the received backscattered electrons.

14. The apparatus of claim 13, wherein the beamlet control mechanism comprises a single aperture plate movable relative to a multi-beam aperture array, wherein an alignment of the single aperture plate and one of an array of apertures defined on the multi-beam aperture array is utilized to deliver one of the plurality of beamlets toward the target.

15. The apparatus of claim 13, wherein the beamlet control mechanism comprises an array of blanking devices defined to correspond to an array of apertures defined on a multi-beam aperture array, wherein selective engagement and disengagement of the array of blanking devices is utilized to deliver one of the plurality of beamlets toward the target.

16. The apparatus of claim 13, wherein the beamlet control mechanism comprises a multi-beam aperture array with a blanking device incorporated within each aperture defined on the multi-beam aperture array.

17. The apparatus of claim 13, wherein the image of the target includes a backscattered electrons (BSE) image of the target.

18. The apparatus of claim 13, further comprising: an energy filter configured to selectively block the array of detectors from receiving secondary electrons generated when one of the plurality of beamlets is delivered to the target.

19. An apparatus, comprising: an electron source; a beamlet control mechanism configured to produce a plurality of beamlets utilizing electrons provided by the electron source, the beamlet control mechanism further configured to deliver a first beamlet of the

plurality of beamlets toward a target at a first time instance and a second beamlet of the plurality of beamlets toward the target at a second time instance; and a detector configured to produce an image of the target at least partially based on electrons backscattered out of the target, wherein the detector is further configured to receive electrons backscattered out of the target for two or more beamlets delivered toward the target at the first and second time instances, wherein the detector is further configured to produce the image of the target at least partially based on a sum of the received backscattered electrons.

20. The apparatus of claim 19, wherein the beamlet control mechanism comprises a single aperture plate movable relative to a multi-beam aperture array, wherein an alignment of the single aperture plate and one of an array of apertures defined on the multi-beam aperture array is utilized to deliver one of the plurality of beamlets toward the target.

21. The apparatus of claim 19, wherein the beamlet control mechanism comprises an array of blanking devices defined to correspond to an array of apertures defined on a multi-beam aperture array, wherein selective engagement and disengagement of the array of blanking devices is utilized to deliver one of the plurality of beamlets toward the target.

22. The apparatus of claim 19, wherein the beamlet control mechanism comprises a multi-beam aperture array with a blanking device incorporated within each aperture defined on the multi-beam aperture array.