CLAIMS

1. A system comprising:

a stage configured to hold a wafer;

an electron source that generates an electron beam;

a scanning electron beam column coupled to the electron source, wherein the scanning electron beam column directs the electron beam at the stage, and wherein the electron beam is directed at a normal angle relative to a top surface of the stage;

a detector configured to receive the electron beam reflected from the wafer on the stage;

an ion source that generates an ion beam; and

an ion beam column coupled to the ion source, wherein the ion beam column directs the ion beam at the stage,

wherein the ion beam column direct the ion beam at an angle relative to the electron beam;

wherein the ion beam column includes an ion beam condenser lens, an ion beam deflector, an ion beam aperture, an ion beam objective lens;

wherein a beam bender disposed in a path of the ion beam between the ion beam aperture and the ion beam objective lens;

wherein the beam bender is configured to be a blanker that prevents the ion beam from impacting the wafer; and

wherein the beam bender is configured to bend the ion beam in the ion beam column when the ion beam is impacting the wafer.

2. The system of claim 1, wherein the scanning electron beam column includes a gun lens, an electron beam aperture, an electron beam condenser lens, at least two electron beam deflectors, and an electron beam objective lens.

3. The system of claim 2, wherein the electron beam objective lens is disposed in a path of the electron beam between the stage and the electron source, wherein the at least two electron beam deflectors are disposed in the path of the electron beam between the electron beam objective lens and the electron source, wherein the electron beam condenser lens is disposed in the path of the electron beam between the at least two electron beam deflectors and the electron source, wherein the electron beam aperture is disposed in the path

of the electron beam between the electron beam condenser lens and the electron source, and wherein the gun lens is disposed in the path of the electron beam between the electron beam aperture and the electron source.

4. The system of claim 1, wherein the ion beam objective lens is disposed in the path of the ion beam between the stage and the ion source, wherein the beam bender is disposed in the path of the ion beam between the ion beam objective lens and the ion source, wherein the ion beam aperture is disposed in the path of the ion beam between the beam bender and the ion source, wherein the ion beam deflector is disposed in the path of the ion beam between the ion beam aperture and the ion source, and wherein the ion beam condenser lens is disposed in the path of the ion beam between the ion beam deflector and the ion source.

5. The system of claim 1, wherein the ion beam column is electrostatic.

6. The system of claim 1, further comprising a xenon source in fluid communication with the ion source.

7. The system of claim 1, wherein the ion beam column provides a Gaussian beam mode and a projection beam mode.

8. The system of claim 1, wherein the angle is from 50° to 60°.

9. The system of claim 8, wherein the angle is 60°.

10. The system of claim 1, further comprising:

a second ion source that generates a second ion beam; and

a second ion beam column coupled to the second ion source, wherein the second ion beam column directs the second ion beam at the stage, and wherein the second ion beam column directs the second ion beam at a 90° azimuthal angle with respect to the ion beam.

11. The system of claim 1, further comprising a processor configured to control blanking of the ion beam and the electron beam.

12. A method comprising:

directing an ion beam at a wafer on a stage whereby the ion beam mills the wafer, wherein the ion beam is directed through an ion beam column that includes an ion beam

condenser lens, an ion beam deflector, an ion beam aperture, an ion beam objective lens, and a beam bender disposed in a path of the ion beam between the ion beam aperture and the ion beam objective lens, and wherein the beam bender is configured to bend the ion beam in the ion beam column when the ion beam is impacting the wafer;

blanking the ion beam using the beam bender such that the ion beam does not reach the wafer;

directing an electron beam at the wafer during the blanking, wherein the electron beam is directed through an electron beam column, wherein the ion beam column directs the ion beam at an angle relative to the electron beam, and wherein the electron beam is directed at a normal angle relative to a top surface of the wafer; and

determining, using a processor, a depth that the wafer was ion beam milled based on images captured using the electron beam.

13. The method of claim 12, wherein the ion beam includes xenon ions.

14. The method of claim 12, wherein the angle is from 50° to 60°.

15. The method of claim 14, wherein the angle is 60°.

16. The method of claim 12, further comprising detecting a signal of the electron beam reflected from the wafer to image the wafer and performing defect inspection of the wafer using a processor.

17. The method of claim 12, further comprising directing a second ion beam at the wafer on the stage, wherein the second ion beam is directed at a 90° azimuthal angle with respect to the ion beam.

18. The method of claim 12, wherein a beam current of the ion beam is from 100 nA to 1 μA.