CLAIMS

1. A system, comprising:

a vacuum chamber configured to provide a pressure of 10^{-9} Torr or lower;

a moveable component, disposed in the vacuum chamber, that heats up during operation;

a cooling line, mechanically coupled to the component, to circulate coolant to cool the component during operation, wherein the cooling line contains the coolant and further contains a marker species to circulate along with the coolant in the cooling line;

a vacuum gauge to measure a total pressure in the vacuum chamber; and

an analyzer to measure a partial pressure in the vacuum chamber of the marker species.

2. The system of claim 1, further comprising a chiller to chill the coolant in the cooling line, wherein:

the chiller is disposed outside of the vacuum chamber; and

the cooling line extends out of the vacuum chamber, through the chiller, and back into the vacuum chamber.

3. The system of claim 1, wherein the coolant comprises ordinary water.

4. The system of claim 3, wherein the marker species is heavy water.

5. The system of claim 3, wherein the marker species corresponds to 1-propanol.

6. The system of claim 1, wherein the vacuum chamber is a vacuum chamber in a scanning electron microscope (SEM).

7. The system of claim 1, further comprising extreme ultraviolet (EUV) optics disposed within the vacuum chamber.

8. The system of claim 1, further comprising electron optics disposed within the vacuum chamber, the electron optics comprising a magnetic lens.

9. The system of claim 1, wherein the analyzer comprises a mass spectrometer.

10. The system of claim 1, wherein the analyzer comprises an infrared spectrometer.

11. The system of claim 1, wherein the cooling line comprises flexible plastic.

12. The system of claim 1, wherein the cooling line comprises a coolant manifold in the vacuum chamber.

13. A method, comprising:

providing, in a vacuum chamber, a pressure of 10^{-9} Torr or lower;

operating a component disposed in the vacuum chamber, wherein operating the component comprises moving the component and causes heating;

circulating coolant through a cooling line mechanically coupled to the component, to cool the component;

circulating a marker species along with the coolant in the cooling line;

measuring a total pressure in the vacuum chamber;

measuring a partial pressure in the vacuum chamber of the marker species; and

based on the partial pressure, determining whether the cooling line has a leak.

14. The method of claim 13, wherein the coolant comprises ordinary water.

15. The method of claim 14, wherein the marker species is heavy water.

16. The method of claim 14, wherein the marker species corresponds to 1-propanol.

17. The method of claim 13, wherein measuring the partial pressure comprises performing mass spectrometry.

18. The method of claim 13, wherein measuring the partial pressure comprises performing infrared spectroscopy.

19. The method of claim 13, wherein the cooling line comprises a coolant manifold in the vacuum chamber.