CLAIMS

1. A system comprising:

a housing comprising an internal wall;

a radiation-receiving component arranged within a chamber defined at least in part by the internal wall;

a cooling apparatus arranged to cool at least a portion of the internal wall to a temperature below that of the radiation-receiving component such that during use of the cooling apparatus a contaminant within the housing rests preferentially on the internal wall relative to the radiation-receiving component; wherein the cooling apparatus is arranged to provide a difference in temperature between the at least a portion of the internal wall and the radiation-receiving component of at least 40 K; and

a second cooling apparatus arranged to cool the radiation-receiving component, wherein the radiation-receiving component comprises a material having a zero-crossing-temperature of a coefficient of thermal expansion and the second cooling apparatus is arranged to cool the radiation-receiving component such that the radiation-receiving component is maintained within a predetermined range of temperatures around the zero-crossing-temperature during an exposure operation of a lithographic apparatus.

2. The system of claim 1, wherein the cooling apparatus is arranged to cool the radiation-receiving component to a temperature of between approximately 122 and 125 K prior to an exposure operation of a lithographic apparatus.

3. The system of claim 1 or 2, wherein the cooling apparatus is arranged to cool the radiation-receiving component to a temperature of approximately 123 K during an exposure operation of a lithographic apparatus.

4. A system comprising:

a housing comprising an internal wall;

a radiation-receiving component arranged within a chamber defined at least in part by the internal wall;

a cooling apparatus arranged to cool at least a portion of the internal wall to a temperature below that of the radiation-receiving component such that during use of the cooling apparatus a contaminant within the housing rests preferentially on the internal wall relative to the radiation-receiving component.

wherein the cooling apparatus is arranged to provide a difference in temperature between the at least a portion of the internal wall and the radiation-receiving component of at least 40 K.

5. The system of claim 4, wherein the cooling apparatus is arranged to cool the at least a portion of the internal wall to a temperature of 77 K or below.

6. The system of claim 4 or 5, wherein the housing comprises at least one of:

an illumination system configured to condition a radiation beam;

a support structure constructed to support a patterning device, the patterning device being capable of imparting the radiation beam with a pattern in its cross-section to form a patterned radiation beam; and

a substrate table constructed to hold a substrate;

a projection system configured to project the patterned radiation beam onto the substrate, or/and wherein the system is arranged to provide an ultra-high vacuum within a chamber at least partially defined by the internal wall.

7. The system of any one of claims 4-6, wherein the cooling apparatus is arranged to provide liquid nitrogen to the internal wall.

8. The system of any one of preceding claims, wherein the radiation-receiving component comprises at least one of: a mirror, a lens, a substrate, a wafer and a patterning device.

9. The system of claim 1, wherein the second cooling apparatus comprises a substrate cooling apparatus arranged to cool a substrate or the system of one of claims 1 to 4, wherein the cooling apparatus comprises a substrate cooling apparatus arranged to cool a substrate.

10. The system of claim 9, wherein the substrate cooling apparatus comprises an apparatus arranged to cool a substrate table constructed to hold the substrate.

11. The system of claim 10, wherein the substrate cooling apparatus comprises;

a coolant container within, or in thermal communication with, the substrate table;

a coolant supply apparatus arranged for releasable connection to the coolant container and arranged to provide coolant to the coolant container and to drain spent coolant from the coolant container.

12. The system of claim 11, wherein the coolant container is arranged to hold liquid nitrogen at a pressure of 30 bar.

13. The system of any one of claims 1 to 12, wherein the radiation-receiving component comprises at least one of:

an optical component within the illumination system;

the patterning device; and

an optical component within the projection system.

14. The system of any of claims 1 to 13, wherein the radiation-receiving component is constructed from at least one of: silicon, germanium, silicon carbide.

15. The system of any one of claims 1 to 3, wherein the cooling apparatus is arranged to provide liquid nitrogen to the radiation-receiving component or to a component in thermal contact with the radiation-receiving component or the system of any one of claims 1 to 14, wherein the second cooling apparatus is arranged to provide liquid nitrogen to the radiation-receiving component or to a component in thermal contact with the radiation-receiving component.

16. A system comprising:

a housing comprising an internal wall;

a radiation-receiving component arranged within a chamber defined at least in part by the internal wall;

a cooling apparatus arranged to cool at least a portion of the internal wall to a temperature below that of the radiation-receiving component such that during use of the cooling apparatus a contaminant within the housing rests preferentially on the internal wall relative to the radiation-receiving component

a second cooling apparatus arranged to cool the radiation-receiving component, wherein the radiation-receiving component comprises a material having a zero-crossing-temperature of a coefficient of thermal expansion and the second cooling apparatus is arranged to cool the radiation-receiving component such that the radiation-receiving component is maintained within a predetermined range of temperatures around the zero-crossing-temperature during an exposure operation of a lithographic apparatus.

17. A method comprising:

cooling at least a portion of an internal wall of a housing of a lithographic apparatus arranged to project a pattern from a patterning device onto a substrate,

the cooling comprising cooling to a temperature below that of a radiation-receiving component arranged within a chamber defined at least in part by the internal wall; and

the cooling being such that during the cooling a contaminant within the housing rests preferentially on the internal wall relative to the radiation-receiving component;

wherein cooling at least a portion of the internal wall provides a difference in temperature between the at least a portion of the internal wall and the radiation-receiving component of at least 40 K.