CLAIMS

WHAT IS CLAIMED IS:

1. A system comprising:

a first subsystem,

wherein the first subsystem is located in a sub-fabrication area of a semiconductor manufacturing facility;

a second subsystem,

wherein the second subsystem is located in a fabrication area of the semiconductor manufacturing facility; and

a coated conduit connecting the first subsystem to the second subsystem, the conduit having an inner surface, an outer surface, and a protective coating deposited on and covering the inner surface,

wherein when a gas or vapor is flowed through the coated conduit having the protective coating, the gas or vapor shows at least a 50% reduction in a metal impurity detected in the gas or vapor compared to when the gas or vapor is flowed through an uncoated conduit having no protective coating.

2. The system of claim 1, wherein the coated conduit is a gas line for carrying a process gas from the first subsystem to the second subsystem.

3. The system of claim 1, wherein the coated conduit fluidly connects at least one container of the first subsystem to at least one container of the second subsystem.

4. The system of claim 1, wherein a distance between an inlet of the coated conduit and an outlet of the coated conduit is at least 2.5 m.

5. The system of claim 1, wherein a ratio of a length of the coated conduit to a width of a cross-section of the coated conduit ranges from 2:1 to 1000:1.

6. The system of claim 1, wherein the protective coating covers at least 99.999% of the inner surface of the coated conduit.

7. The system of claim 1, wherein the protective coating comprises at least one of yttria, alumina, or any combination thereof.

8. The system of claim 1, wherein when ozone gas is flowed through the coated conduit having the protective coating, the ozone gas shows at least a 50% reduction in a chromium impurity detected in the ozone gas compared to when ozone gas is flowed through an uncoated conduit having no protective coating.

9. The system of claim 1, wherein when ozone gas is flowed through the coated conduit having the protective coating, the ozone gas shows at least a 50% reduction in a manganese impurity detected in the ozone gas compared to when ozone gas is flowed through an uncoated conduit having no protective coating.

10. The system of claim 1, wherein when MoO_2Cl_2 vapor is flowed through the coated conduit having the protective coating, the MoO_2Cl_2 vapor shows at least a 50% reduction in an iron impurity detected in the MoO_2Cl_2 vapor compared to when MoO_2Cl_2 vapor is flowed through an uncoated conduit having no protective coating.

11. A method comprising:

forming a protective coating on an inner surface of a conduit via atomic layer deposition (ALD), the conduit having a length extending from an outlet to an inlet of the conduit of at least 2.5 m.

12. The method of claim 11, further comprising:

after forming the protective coating, applying a force to the conduit sufficient to bend at least a portion of the conduit.

13. The method of claim 11, further comprising flowing a gas or vapor through the conduit having the protective coating formed on its inner surface, and collecting the gas or vapor that is flowed through the conduit at the outlet of the conduit, wherein the gas or vapor collected at the outlet shows at least a 50% reduction in a metal impurity compared to when the gas or vapor is flowed through an uncoated conduit having no protective coating.

14. An article comprising:

a coated conduit,

wherein the coated conduit extends from an inlet to an outlet, the coated conduit having an inner surface and an outer surface; and a protective coating deposited on and covering the inner surface; and

wherein when a gas or vapor is flowed through the coated conduit having the protective coating, the gas or vapor shows at least a 50% reduction in a metal impurity compared to when the gas or vapor is flowed through an uncoated conduit having no protective coating.

15. The article of claim 14, wherein the coated conduit is a gas line for carrying a process gas from the first subsystem to the second subsystem.

16. The article of claim 14, wherein a distance between an inlet of the coated conduit and an outlet of the coated conduit is at least 2.5 m.

17. The article of claim 14, wherein the protective coating comprises at least one of yttria, alumina, or any combination thereof.

18. The article of claim 14, wherein when ozone gas is flowed through the coated conduit having the protective coating, the ozone gas shows at least a 50% reduction in a chromium impurity compared to when ozone gas is flowed through an uncoated conduit having no protective coating.

19. The article of claim 14, wherein when ozone gas is flowed through the coated conduit having the protective coating, the ozone gas shows at least a 50% reduction in a manganese impurity compared to when ozone gas is flowed through an uncoated conduit having no protective coating.

20. The article of claim 14, wherein when MoO_2Cl_2 vapor is flowed through the coated conduit having the protective coating, the MoO_2Cl_2 vapor shows at least a 50% reduction in an iron impurity compared to when MoO_2Cl_2 vapor is flowed through an uncoated conduit having no protective coating.