Claims

1. An acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

a solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the solvent;

said solvent comprising triethyl phosphate (TEP), said TEP loaded into the pressure vessel in an amount no greater than 0.64 kg of TEP per liter of volume of the pressure vessel.

2. The acetylene fluid supply package of claim 1, wherein said TEP is loaded into the pressure vessel in an amount no greater than 0.61 kg of TEP per liter of volume of the pressure vessel.

3. The acetylene fluid supply package of claim 1, wherein said TEP is loaded into the pressure vessel in an amount no greater than 0.58 kg of TEP per liter of volume of the pressure vessel.

4. The acetylene fluid supply package of claim 1, further comprising the acetylene in a stabilized state at a pressure of up to 300 psig at 21°C.

5. A system comprising at least one acetylene fluid supply package and an acetylene-utilizing process tool in fluid communication with the at least one acetylene fluid supply package, said at least one acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

a solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the solvent;

said solvent comprising triethyl phosphate (TEP), said TEP loaded into the pressure vessel in an amount no greater than 0.64 kg of TEP per liter of volume of the pressure vessel;

wherein the at least one acetylene fluid supply package is configured to allow a discharge of the acetylene fluid under dispensing conditions; and

further wherein said acetylene-utilizing process tool is configured to receive the acetylene fluid from the at least one acetylene fluid supply package.

6. The system of claim 5, wherein the process tool comprises a chemical vapor deposition tool.

7. The system of claim 5 wherein the at least one at least one acetylene fluid supply package is contained in a gas cabinet.

8. The system of claim 5, wherein said TEP is loaded into the pressure vessel in an amount no greater than 0.61 kg of TEP per liter of volume of the pressure vessel.

9. The system of claim 5, wherein said TEP is loaded into the pressure vessel in an amount no greater than 0.58 kg of TEP per liter of volume of the pressure vessel.

10. A method of fabricating a semiconductor device, comprising:

providing a semiconductor substrate; and

forming a carbon-containing layer on the semiconductor substrate using an acetylene fluid supply package,

wherein the acetylene fluid supply package comprises a pressure vessel, a porous filler in the pressure vessel, and a solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the solvent,

the vapor pressure of the solvent is 6 torr or less at 20°C,

the Hansen solubility factor (δh) of the solvent is 5 $Mpa^{0.5}$ or more, and

the reproductive toxicity of the solvent is lower than that of dimethylformamide (DMF).

11. The method of claim 10, wherein the solvent includes triethyl phosphate (TEP), said TEP loaded into the pressure vessel in an amount no greater than 0.64 kg of TEP per liter of volume of the pressure vessel.

12. The method of claim 10, wherein the solvent includes at least one of N,N,N',N'-tetramethylmethyl-phosphondiamide, tetramethylene sulfoxide, tetramethylurea, N-acetyl pyrrolidine, tris(N,N-tetramethylene)phosphoramide, methyl naphthodioxane, trimethyl phosphite and tetramethyldiamidophosphoryl fluoride.

13. The method of claim 10, further comprising:

forming an etch target film on the semiconductor substrate, and

etching the etch target film using the carbon-containing layer as an etch mask.

14. The method of claim 10, further comprising:

forming a mold layer on the semiconductor substrate, the carbon-containing layer is formed in the mold layer; and

removing the carbon-containing layer in the mold layer.

15. The method of claim 10, further comprising:

forming a first active pattern and a second active pattern, which are spaced apart from each other on the semiconductor substrate,

wherein the carbon-containing layer fills at least a part between the first active pattern and the second active pattern.

16. The method of claim 10, wherein the carbon-containing layer includes graphene.