Claims:

1. A storage system for storing adsorbed reagent gas, the system comprising:

a high pressure storage vessel comprising an interior that contains nano-porous pyrolyzed carbon adsorbent particles, and

reagent gas adsorbed on the adsorbent particles,

wherein a pressure at the interior is below 1500 torr.

2. The storage system of claim 1, wherein the adsorption media comprises pyrolyzed polyvinylidene chloride particles having an average particle size in a range from 1 to 10 millimeters.

3. The storage system of claim 1, wherein the adsorption media comprises pyrolyzed polyvinylidene chloride particles having an average pore size below 20 angstroms.

4. The storage system of claim 1, wherein the adsorbent comprises pyrolyzed polyvinylidene chloride particles having a bulk density in a range of 0.55 to 0.95 grams per cubic centimeter.

5. The storage system of claim 1, wherein the adsorbent comprises pyrolyzed polyvinylidene chloride particles having a particle density in a range of 0.85 to 1.15 grams per cubic centimeter.

6. A method of dispensing the adsorbed reagent gas from a storage system of any of claims 1 through 5, wherein the adsorbed reagent gas comprises: methane (CH_4), acetylene (C_2H_2), ammonia (NH_3), silane (SiH_4), germane (GeH_4), diphosphene (P_2H_4) phosphine (PH_3), arsine (AsH_3), diborane (B_2H_6), stibine (SbH_3), hydrogen sulfide (H_2S), hydrogen selenide (H_2Se), hydrogen telluride (H_2Te), digermane (Ge_2H_6), diacetylene (C_4H_2) germanium tetrafluoride (GeF_4), phosphorous pentafluoride (PF_5), arsenic pentafluoride (AsF_5), silicon tetrafluoride (SiF_4), antimony pentafluoride (SbF_5), boron trifluoride (BF_3), boron tetrafluoride (B_2F_4), and all isotopes of these reagent gases.

7. A method of dispensing the adsorbed reagent gas from a storage system of any of claims 1 through 5, comprising dispensing the reagent gas from the vessel with the dispensed

reagent gas containing less than 150 parts per million (by volume, ppmv) of a total amount of impurities selected from H_2, CO, CO_2, N_2, CH_4, and H_2O, and combinations thereof.

8. A storage system for storing adsorbed reagent gas, the system comprising:

a high pressure storage vessel comprising:

polished sidewall surfaces having a roughness (Ra) of less than 1 nm,

non-welded sidewalls and bottom,

a volume of at least 10 liters, and

nano-porous pyrolyzed carbon adsorbent particles.

9. The storage system of claim 8, wherein the adsorption media comprises pyrolyzed polyvinylidene chloride particles having an average particle size in a range from 1 to 10 millimeters.

10. The storage system of claim 8, wherein the adsorption media comprises pyrolyzed polyvinylidene chloride particles having a pore size below 20 angstroms.

11. The storage system of claim 8, wherein the adsorbent comprises pyrolyzed polyvinylidene chloride particles having a bulk density in a range of 0.55 to 0.95 grams per cubic centimeter.

12. The storage system of claim 8, wherein the adsorbent comprises pyrolyzed polyvinylidene chloride particles having a particle density in a range of 0.85 to 1.15 grams per cubic centimeter.

13. A method of preparing carbon adsorbent particles, the method comprising:

forming synthetic polymer carbon precursor resin particles,

pyrolyzing the precursor resin particles in an inert atmosphere to produce nano-porous pyrolyzed carbon adsorbent particles,

placing the pyrolyzed carbon adsorbent particles into a high pressure storage vessel while containing the particles and the vessel in an inert gas atmosphere,

exposing the pyrolyzed carbon adsorbent particles in the vessel to elevated temperature and reduced pressure to remove atmospheric contaminants adsorbed on the particles and the vessel, and

filling the vessel with the reagent gas.