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, the nano-porous pyrolyzed carbon adsorbent particles comprising pyrolyzed polyvinylidene chloride particles individually having a porosity of at least 0.35 cubic centimeters per gram and having a bulk density in a range of 0.55 to 0.95 grams per cubic centimeter, 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 nano-porous pyrolyzed carbon adsorbent particles comprise 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 nano-porous pyrolyzed carbon adsorbent particles comprise pyrolyzed polyvinylidene chloride particles having an average pore size below 20 angstroms.

4. The storage system of claim 1, wherein the nano-porous pyrolyzed carbon adsorbent particles comprise pyrolyzed polyvinylidene chloride particles having a particle density in a range of 0.85 to 1.15 grams per cubic centimeter.

5. The storage system of claim 1, wherein the storage vessel comprises:

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

non-welded sidewalls and bottom,

a volume of at least 10 liters.

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.