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Liu

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(54) **CATALYZED CO₂-TRANSPORT MEMBRANE ON HIGH SURFACE AREA INORGANIC SUPPORT**

(75) Inventor: **Wei Liu**, Richland, WA (US)

(73) Assignee: **Battelle Memorial Institute**, Richland, WA (US)

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(52) **U.S. Cl.**
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(58) **Field of Classification Search**
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See application file for complete search history.

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Primary Examiner — Jason M Greene

(74) *Attorney, Agent, or Firm* — Klarquist Sparkman, LLP

(57) **ABSTRACT**

Disclosed are membranes and methods for making the same, which membranes provide improved permeability, stability, and cost-effective manufacturability, for separating CO₂ from gas streams such as flue gas streams. High CO₂ permeation flux is achieved by immobilizing an ultra-thin, optionally catalyzed fluid layer onto a meso-porous modification layer on a thin, porous inorganic substrate such as a porous metallic substrate. The CO₂-selective liquid fluid blocks non-selective pores, and allows for selective absorption of CO₂ from gas mixtures such as flue gas mixtures and subsequent transport to the permeation side of the membrane. Carbon dioxide permeance levels are in the order of 1.0×10⁻⁶ mol/(m²sPa) or better. Methods for making such membranes allow commercial scale membrane manufacturing at highly cost-effective rates when compared to conventional commercial-scale CO₂ separation processes and equipment for the same and such membranes are operable on an industrial use scale.

22 Claims, 14 Drawing Sheets

