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(54) **POROUS NANOHYBRID MATERIALS FORMED BY COVALENT HYBRIDIZATION BETWEEN METAL-ORGANIC FRAMEWORKS AND GIGANTIC MESOPOROUS MATERIALS**

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See application file for complete search history.

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(57) **ABSTRACT**

Disclosed herein is a nanoporous hybrids formed by covalent bonding between a crystalline organic-inorganic hybrid and a gigantic mesoporous metal oxide, containing organic groups on the surface thereof, having a size of 10 nm or more. Since the covalently-bonded hybrid nanoporous composite has a large surface area, a multiple microporous structure, a large pore volume and includes an organic-inorganic hybrid having backbone flexibility, the covalently-bonded hybrid nanoporous composite can be used as materials for storing liquids and gases, such as hydrogen, methane and the like, and can be used as adsorbents, separating materials, catalysts, and the like. Further, the covalently-bonded hybrid nanoporous hybrids can be used in the application fields of biomolecule supporting, drug delivery, harmful material removal, nanoparticle supporter, sensors, catalysis, adsorbents, fluorescent materials, solar cells, and the like.

**14 Claims, 6 Drawing Sheets**

