[0006] In some aspects, the present disclosure provides a method of preparing a transition metal epoxidation catalyst, the method comprising:

a) obtaining a solid silica support;

b) reacting the solid silica support with a silicon alkoxide of the formula:

$$SiX_Y$$

wherein each X is independently halide, alkoxylate$_{(C\leq12)}$, alkenyloxylate$_{(C\leq12)}$, alkynyloxylate$_{(C\leq12)}$, aryloxylate$_{(C\leq12)}$, heteroaryloxylate$_{(C\leq12)}$, aralkyloxylate$_{(C\leq12)}$, aralkenyloxylate$_{(C\leq12)}$, heterocycloalkyloxylate$_{(C\leq12)}$, acyloxylate$_{(C\leq12)}$, or a substituted version of any of these groups bearing a net negative charge; and Y is equal to the oxidation state of Si; and

c) depositing titanium from a titanium source on the solid silica support thereby forming a catalyst.

[0007] In some embodiments, the solid silica support is a porous material. In some embodiments, the solid support has an average particle size from about 0.1 μm to about 1.5 cm. In some embodiments, the solid support has an average particle size from about 0.7 mm to about 3.0 mm. In some embodiments, the solid silica support has a surface area between about 20 m^2/g and about 1500 m^2/g. In some embodiments, the solid silica support has a surface area between about 300 m^2/g and about 1100 m^2/g. In some embodiments, the solid silica support has a pore volume between about 0.1 mL/g and about 4.5 mL/g. In some embodiments, the solid silica support has a pore volume between about 0.5 mL/g and about 3.0 mL/g. In some embodiments, the solid silica support is an amorphous material. In some embodiments, the solid support is a zeolite. In some embodiments, the oxidation state of the silicon is a positive oxidation state. In some embodiments, the silicon support contains a component having the formula:

$$SiX_4$$

wherein: each X is independently halide, alkoxylate$_{(C\leq12)}$, aralkoxylate$_{(C\leq12}$, aryloxylate$_{(C\leq12)}$, or a substituted version of any of these groups. In some embodiments, X is alkoxylate$_{(C\leq12)}$. In some embodiments, X is methoxylate, ethyoxylate, isopropoxylate, or tert-butoxylate. In some embodiments, X is isopropoxylate. In some embodiments, the titanium source is a liquid or a gas. In some embodiments, the titanium source is titanium trihalide, titanium tetrahalide, or titanium tetraalkoxylate.

[0008] In some embodiments, the titanium source is titanium tetrachloride. In some embodiments, titanium deposited from the titanium source comprises between about 0.1 weight % and about 10 weight % of the catalyst. In some embodiments, the titanium deposited from the

CLAIMS

1. A method comprising:

   a) obtaining a solid silica support;

   b) reacting the solid silica support with a silicon alkoxide of the formula:

   $$SiX_Y;$$

   wherein:

   each X is independently halide, alkoxylate$_{(C\leq12)}$, alkenyloxylate$_{(C\leq12)}$, alkynyloxylate$_{(C\leq12)}$, aryloxylate$_{(C\leq12)}$, heteroaryloxylate$_{(C\leq12)}$, aralkyloxylate$_{(C\leq12)}$, aralkenyloxylate$_{(C\leq12)}$, heterocycloalkyloxylate$_{(C\leq12)}$, acyloxylate$_{(C\leq12)}$, or a version of any of these groups bearing a net negative charge; and

   Y is equal to the oxidation state of Si; and

   c) depositing titanium from a titanium source on the solid silica support reacted with a silicon alkoxide to form a catalyst in an initial inert gas environment and then in an environment comprising oxygen.

2. The method of claim 1, wherein the solid silica support has an average particle size of 0.7 mm-3.0 mm.

3. The method of claim 1, wherein the solid silica support has a surface area of 300-1100 m^2/g.

4. The method of claim 1, wherein the solid silica support has a pore volume of 0.5-3.0 mL/g.