CLAIMS

1. An oil-based drilling fluid comprising:

a base oil continuous phase comprising a base oil;

an aqueous dispersed phase; and

at least one rheology modifier comprising a magnesium/aluminum layered-double hydroxide diamondoid compound.

2. The oil-based drilling fluid of claim 1, in which the magnesium/aluminum layered-double hydroxide diamondoid compound comprise:

a general formula defined by $[Mg_{1-x}Al_x(OH)_2](A)_x \cdot mH_2O$, where x is from 0.2 to 0.5, m is from 0.33 to 0.50, and A is adamantane carboxylate; and

an aspect ratio greater than 100, the aspect ratio defined by a width of the Mg/Al LDH diamondoid compound divided by a thickness of the Mg/Al LDH diamondoid compound.

3. The oil-based drilling fluid of claim 1, in which the magnesium/aluminum double-layered hydroxide diamondoid compound is a magnesium/aluminum adamantane compound.

4. The oil-based drilling fluid of claim 1, in which:

the base oil continuous phase comprises a base oil chosen from a synthetic oil comprising an ester or olefin, a diesel oil, or a mineral oil, in which the synthetic oil, the diesel oil, or the mineral oil comprises hydrocarbons chosen from n-paraffins, iso-paraffins, cyclic alkanes, branched alkanes, or mixtures of the hydrocarbons; and

the aqueous dispersed phase contains a brine chosen from calcium chloride, calcium bromide, sodium chloride, sodium bromide, and combinations thereof.

5. The oil-based drilling fluid of any one of claims 1 to 4, further comprising:

at least one additive chosen from emulsifiers, wetting agents, alkalinity control agents, fluid-loss control agents, suspending agents, weight-adjusting agents, density-adjusting agents, or combinations of the additives; or

from 0.1 wt.% to 1.0 wt.% rheology modifier, based on the total weight of the oil-based drilling fluid.

6. A method for preparing an oil-based drilling fluid, the method comprising:

mixing a base oil, optionally an emulsifier, and optionally a wetting agent to form a first mixture; and

mixing an aqueous dispersed phase and at least one rheology modifier into the first mixture to form an oil-based drilling fluid, the at least one rheology modifier comprising a layered-double hydroxide magnesium/aluminum-diamondoid compound.

7. The method of claim 6, further comprising:

adding into the oil-based drilling fluid at least one of a brine solution, a weighting additive, or a fluid-loss control additive.

8. The method of claim 6, further comprising preparing the magnesium/aluminum layered double hydroxide diamondoid compound by:

mixing a magnesium salt, an aluminum salt, a solvent, and a diamondoid compound having at least one carboxylic acid moiety to form a reactant mixture; and

heating the reactant mixture at a reaction temperature of from 100 °C to 180 °C for a reaction time of at least 12 hours to form the magnesium/aluminum layered double hydroxide diamondoid compound.

9. The method of any one of claims 6 to 8, in which the magnesium/aluminum layered double hydroxide diamondoid compound is derived from $Mg(OH)_2$, $Al(OH)_3$, and 1-adamantane carboxylic acid.

10. The method of any one of claims 6 to 8, in which the base oil continuous phase comprises a base oil chosen from a synthetic oil comprising an ester or olefin, a diesel oil, or a mineral oil, in which the synthetic oil, the diesel oil, or the mineral oil comprises hydrocarbons chosen from n-paraffins, iso-paraffins, cyclic alkanes, branched alkanes, or mixtures thereof.

11. The method of any one of claims 6 to 8, in which:

the oil-based drilling fluid comprises from 0.1 wt.% to 1.0 wt.% rheology modifier, based on the total weight of the oil-based drilling fluid; and

the brine solution is chosen from calcium chloride, calcium bromide, sodium chloride, sodium bromide, and combinations thereof.

12. The method of any one of claims 6 to 8, in which:

the base oil continuous phase comprises a base oil chosen from a synthetic oil comprising an ester or olefin, a diesel oil, or a mineral oil, in which the synthetic oil, the diesel oil, or the mineral oil comprises hydrocarbons chosen from n-paraffins, iso-paraffins, cyclic alkanes, branched alkanes, or mixtures thereof;

the oil-based drilling fluid comprises from 0.1 wt.% to 1.0 wt.% rheology modifier, based on the total weight of the oil-based drilling fluid; and

the brine solution is chosen from calcium chloride, calcium bromide, sodium chloride, sodium bromide, and combinations thereof.

13. A method for drilling in a subterranean well, the method comprising:

operating a drill in a wellbore in the presence of an oil-based drilling fluid comprising:

a base oil;

at least one additive chosen from an emulsifier, a weighting material, a fluid-loss additive, a viscosifiers, or an alkali compound; and

from 0.1 wt.% to 1 wt.%, based on the total weight of the drilling fluid, of a magnesium/aluminum adamantane layered double hydroxide compound.

14. The method of claim 13, further comprising:

adding the magnesium/aluminum layered double hydroxide diamondoid compound to the oil-based drilling fluid before or during operating the drill in the wellbore; or

adding the magnesium/aluminum layered double hydroxide diamondoid compound to the oil-based drilling fluid during operating the drill in the wellbore.

15. The method of claims 13 or 14, in which the oil-based drilling fluid is stable under high-pressure high-temperature conditions during drilling operations comprising a wellbore pressure greater than 10,000 psi and a wellbore temperature greater than 300 °F.