WHAT IS CLAIMED IS:

1. A method for lubricating a transmission having an electric or a hybrid-electric motor, the method comprising:

lubricating a transmission having an electric or a hybrid-electric motor with a lubricant;

the lubricant including a poly(meth)acrylate copolymer and a solvent system including a base oil component blended with a branched diester component, the solvent system having about 10 to about 50 weight percent of the branched diester component;

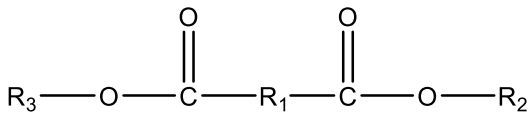
the base oil component including one or more oils selected from Group I to Group V base oils;

the poly(meth)acrylate copolymer has a weight average molecular weight of about 50,000 g/mol or less; and

wherein the branched diester component and the poly(meth)acrylate copolymer are effective so that the lubricant exhibits an electrical conductivity measured per ASTM D2624-15 at 75ºC of about 80,000 pS/m or less and a thermal conductivity measured per ASTM D7896-14 at 80ºC of about 134 mW/m*K or more.

2. The method of claim 1, wherein the branched diester component is a reaction product of one or more dicarboxylic acids having an internal carbon chain length of 6 to 10 carbons and one or more alcohols having a branched carbon chain length of 6 to 12 carbons.

3. The method of claim 1, wherein the branched diester component has the structure of Formula I:



(Formula I)

wherein

R_1 is a carbon chain having n-2 carbons with n being an integer from 6 to 10; and

R_2 and R_3 are the same or different and include C8 to C10 branched alkyl chains.

4. The method of claim 1, wherein the branched diester component is selected from the group consisting of bis(6-methylheptyl) hexanedioate; bis(8-methylnonyl) hexanedioate; bis(2-ethylhexyl) decanedioate; bis(2-ethylhexyl) hexanedioate; and combinations thereof.

5. The method of claim 1, wherein the poly(meth)acrylate copolymer is derived from at least C1 to C4 linear or branched alkyl (meth)acrylates monomer units and C12 to C20 linear or branched alkyl (meth)acrylate monomer units and has a weight average molecular weight of about 10,000 to about 50,000 g/mol.

6. The method of claim 5, wherein the poly(meth)acrylate copolymer has about 5 to about 50 mol percent monomer units derived from the C1 to C4 linear or branched alkyl (meth)acrylates and about 50 to about 95 mol percent monomer units derived from the C12 to C20 linear or branched alkyl (meth)acrylates.

7. A transmission and lubricant for an electric or a hybrid-electric vehicle, the transmission and lubricant comprising:

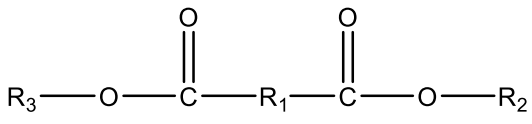
a transmission having an electric or a hybrid-electric motor thereof;

a lubricating composition of the transmission in contact with at least portions of the electric or the hybrid-electric motor; and

the lubricating composition including (i) an solvent system having a blend of one or more base oils selected from Group I to Group V oils and a branched diester, the solvent system having about 10 to about 50 weight percent of the branched diester and (ii) a copolymer viscosity index improver having a weight average molecular weight of about 50,000 g/mol or less; and

wherein the lubricating composition includes amounts of the branched diester and amounts of the copolymer viscosity index improver effective to achieve an electrical conductivity measured per ASTM D2624-15 at 75ºC of about 80,000 pS/m or less and a thermal conductivity measured per ASTM D7896-14 at 80ºC of about 134 mW/m*K or more.

8. The transmission and lubricant of claim 7, wherein the branched diester has the structure of Formula I:



(Formula I)

wherein

R_1 is a carbon chain having n-2 carbons with n being an integer from 6 to 10; and

R_2 and R_3 are the same or different and include C8 to C10 branched alkyl chains.

9. The transmission and lubricant of claim 7, wherein branched diester has C6 to C12 branched alkyl groups in alcohol moieties thereof and 6 to 10 carbons in acid moieties thereof.

10. The transmission and lubricant of claim 7, wherein the branched diester is selected from the group consisting of bis(6-methylheptyl) hexanedioate; bis(8-methylnonyl) hexanedioate; bis(2-ethylhexyl) decanedioate; bis(2-ethylhexyl) hexanedioate; and combinations thereof.

11. The transmission and lubricant of claim 7, wherein the copolymer viscosity index improver includes monomer units derived from C1 to C4 linear or branched short chain alkyl (meth)acrylates and C12 to C20 linear or branched long chain alkyl (meth)acrylates and has a weight average molecular weight of about 10,000 to about 50,000 g/mol.

12. The transmission and lubricant of claim 11, wherein the copolymer viscosity index improver has about 5 to about 50 mol percent monomer units derived from the short chain (meth)acrylates and about 50 to about 95 mol percent monomer units derived from the long chain (meth)acrylates.

13. A lubricating composition for electric or hybrid-electric motors, the lubricating composition comprising:

a solvent system including one or more Group I to Group V base oils blended with a branched diester, wherein the solvent system has about 10 to about 50 weight percent of the branched diester;

a copolymer viscosity index improver having a weight average molecular weight of about 50,000 g/mol or less and a polydispersity index of about 1 to about 2; and

wherein the lubricating composition includes amounts of the branched diester in the solvent system and amounts of the copolymer viscosity index improver effective to achieve an electrical conductivity measured per ASTM D2624-15 at 75ºC of about 80,000 pS/m or less and a thermal conductivity measured per ASTM D7896-14 at 80ºC of about 134 mW/m*K or more at the same time.

14. The lubricating composition of claim 13, wherein the branched diester is the reaction product of one or more dicarboxylic acids having an internal carbon chain length of 6 to 10 carbons and one or more alcohols having a branched carbon chain length of 6 to 12 carbons.

15. The lubricating composition of claim 13, wherein the lubricating composition includes about 5 to about 40 weight percent of the branched diester and about 8 to about 15 weight percent of the copolymer viscosity index improver on an oil-free basis.

16. The lubricating composition of claim 13, wherein an ester-to-copolymer weight ratio in the lubricating composition of about 1.4 to about 5.0, wherein the copolymer is measured on an oil-free basis.

17. The lubricating composition of claim 13, wherein the copolymer viscosity index improver derived from C1 to C4 short chain linear or branched alkyl (meth)acrylates and C12 to C20 long chain linear or branched alkyl (meth)acrylates.