Claims

1. A high-temperature and high-humidity resistant optically clear adhesive, comprising the following components in parts by weight:
   40 parts to 55 parts of a soft monomer;
   10 parts to 25 parts of a hard monomer;
   5 parts to 20 parts of a functional monomer;
   5 parts to 15 parts of a thiourea monomer;
   3 parts to 15 parts of a polyurethane acrylate prepolymer;
   0.2 parts to 2 parts of a photoinitiator;
   0.05 parts to 2 parts of a chain transfer agent;
   0.1 parts to 1 part of a tackifier coupling agent;
   0.1 parts to 1.5 parts of an antioxidant;
   0.05 parts to 1 part of a levelling agent; and
   0.05 parts to 1.5 parts of a crosslinker, wherein
   the polyurethane acrylate prepolymer is primarily prepared by a reaction of a polyol, a polyisocyanate, and a hydroxyl-containing acrylate;
   the polyol comprises polytetramethylene ether glycol and polycaprolactone diol, the polytetramethylene ether glycol and the polycaprolactone diol in the polyol are present at a molar ratio of 1:(0.5-2);
   the polyisocyanate comprises isophorone diisocyanate and hexamethylene diisocyanate, the isophorone diisocyanate and the hexamethylene diisocyanate in the polyisocyanate are present at a molar ratio of 1:(0.5-2);
   the thiourea monomer comprises at least one of 1,3-diallyl 2-thiourea, allyl thiourea, 1-allyl-3-(4-benzylphenyl)thiourea, 1-allyl-3-(pyridin-3-yl)thiourea, 1-allyl-3,3-diethyl-2-thiourea, 1-methallyl-3-methyl-2-thiourea, and N-allyl-N'-2-hydroxyethylthiourea; and
   the functional monomer comprises at least one of acrylic acid, acrylamide, N,N-dimethylacrylamide, hydroxyethyl acrylate, and hydroxybutyl acrylate.

2. The high-temperature and high-humidity resistant optically clear adhesive according to claim 1, comprising at least one of the following characteristics:
   (1) the polyol and the polyisocyanate are present at a molar ratio of 1:(1.2-1.5);

(2) the polyol and the hydroxyl-containing acrylate are present at a molar ratio of 1:(0.8-1.2);

(3) the hydroxyl-containing acrylate comprises at least one of 2-hydroxyethyl acrylate, 4-hydroxybutyl acrylate, and hydroxypropyl acrylate;

(4) the polyurethane acrylate prepolymer is prepared in the presence of a catalyst, wherein the catalyst comprises at least one of dibutyltin dilaurate, triethylenediamine, and stannous octoate; and

(5) the reaction for preparing the polyurethane acrylate prepolymer further comprises a chain extender and/or a filler.

3. The high-temperature and high-humidity resistant optically clear adhesive according to claim 1, wherein the thiourea monomer and the polyurethane acrylate prepolymer are present at a mass ratio of (0.5-3):1.

4. The high-temperature and high-humidity resistant optically clear adhesive according to claim 1, comprising at least one of the following characteristics:

(1) the soft monomer comprises at least one of ethyl acrylate, 2-ethylhexyl acrylate, lauryl acrylate, and butyl acrylate;

(2) the hard monomer comprises at least one of methyl acrylate, methyl methacrylate, isobornyl acrylate, ethyl methacrylate, styrene, and acrylonitrile; and

(3) the crosslinker comprises at least one of diethylene glycol diacrylate, triethylene glycol diacrylate, pentaerythritol triacrylate, and trimethylolpropane triacrylate.

5. A method for preparing the high-temperature and high-humidity resistant optically clear adhesive according to any one of claims 1 to 4, comprising the steps of:

uniformly mixing a soft monomer, a hard monomer, a functional monomer, a thiourea monomer, a polyurethane acrylate prepolymer, and a photoinitiator to obtain a first mixture;

irradiating the first mixture with an ultraviolet light for 3 minutes to 5 minutes;

adding a chain transfer agent, a tackifier coupling agent, an antioxidant, a levelling agent, and a crosslinker to the irradiated first mixture, and uniformly mixing to obtain a second mixture; and

coating the second mixture and curing with ultraviolet light.

6. The method according to claim 5, wherein the optically clear adhesive has a thickness of 50 μm to 300 μm.

7. Use of a high-temperature and high-humidity resistant optically clear adhesive according to any one of claims 1 to 4, or a high-temperature and high-humidity resistant optically clear adhesive prepared by a preparation method according to any one of claims 5 to 6, in display screens.