Claims

1. A process for preparing an acrylic powder coating resin system comprising solution polymerizing at least one acrylic monomer in a non-aqueous solvent in the presence of a hydrophobic submicron particle and an initiator, wherein the at least one acrylic monomer is chosen from epoxy functional monomers, acid functional monomers or combinations thereof, and wherein the polymerizing occurs under water-free conditions.

2. The process of claim 1 wherein the at least one monomer is epoxy functional and is chosen from glycidyl methacrylate or glycidyl acrylate.

3. The process of any one of claims 1 to 2 wherein the at least one monomer is included in an amount from about 10 wt% to about 40 wt%, based on the total monomers to be copolymerized.

4. The process of any one of claims 1 to 3 wherein the one or more acrylic polymer resin systems is epoxy functional and has an EEW from about 250 to about 750.

5. The process of any one of claims 1 to 4 wherein the non-aqueous solvent is selected from the group consisting of toluene, xylene, ethyl acetate, butyl acetate, propyl acetate, methyl amyl ketone, isoamyl acetate , methyl ethyl ketone, methyl isobutyl ketone and mixtures thereof.

6. The process of any one of claims 1 to 5 wherein the one or more hydrophobic submicron particles each comprise an inorganic oxide and one or more organosilicon compounds.

7. The process of claim 6 wherein the inorganic oxide particle is selected from the group consisting of silica, fumed silica, metal oxides, silicates, organic-inorganic oxide composites and mixtures thereof.

8. The process of claim 7 wherein the one or more hydrophobic submicron particles is treated fumed silica formed from the condensation reaction product of dimethyidihalosilane treated fumed silica.

9. The process of any one of claims 1 to 8 wherein the one or more hydrophobic submicron particles is present in the powder coating resin system in the range from about 0.01 wt% to about 2.0 wt. %, based on the total weight of the powder coating resin system.

10. The process of any one of claims 1 to 9 wherein the one or more initiators is a thermal or radical initiator selected from the group consisting of tert-butyl peroxy-2-ethylhexanoate, tert-amyl peroxy-2-ethylhexanoate, tert-butyl peroxydiethylacetate,tert-butyl peroxyisobutyrate, benzoyl peroxide, t-butyl hydroperoxide, tertiary butyl perbenzoate, cumene peroxide, dimethylazobis-isobutyrate, 2,2′-Azobis(2-methylbutyronitrile), 2,2'-azobis(2,4-dimethyl-pentanenitrile), 2,2'-azobis-(2-methylpropanenitrile), t-butyl peroxy pivalate and mixtures thereof.

11. A process for preparing a powder coating composition comprising mixing the powder coating resin system prepared according to the process of any one of claims 1 to 10 with one or more crosslinking agents.

12. The process of claim 11 further comprising dry blending, grinding and extruding the resultant hydrophobic submicron particle-containing acrylic powder coating composition.

13. A coating on a metal substrate comprising the powder coating composition prepared according to the process of claims 11 or 12.

14. The coating of claim 13, wherein the substrate comprises aluminum or a forged alloy.