CLAIMS

1. A method of processing a leadframe assembly to remove undesired material therefrom or to prepare a surface of the leadframe assembly for subsequent bonding wherein a leadframe assembly comprises one or more of the following parts: leadframe, dies, dies having bond pads thereon, contacts, contact leads, and wires, the method comprising the steps of:

attaching one or more dies having bond pads thereon to a leadframe to form a leadframe assembly, said leadframe comprising contact leads having exposed metal surfaces;

contacting said bond pads and said contact leads ~~at least a portion of the leadframe assembly or the one or more parts of the leadframe assembly~~ with a composition comprising (a) water and (b) at least one acid, or at least one salt or (a) water and (b) a mixture of acid and salt to remove metal oxides from said bond pads and said contact leads;

drying the leadframe assembly; and

performing a wirebonding step comprising attaching wires between the bond pads on the one or more dies and the contact leads on the leadframe.

~~2. The method of claim 1 wherein said method further comprises the steps of: drying the leadframe assembly or the one or more parts of the leadframe assembly; and performing a wirebonding step comprising attaching wires between the bond pad on the die and the contact lead on the leadframe.~~

~~3~~2. The method of ~~either of the preceding claims~~claim 1 further comprising the step of forming a mold over the leadframe assembly to form a packaged circuit after said performing step.

~~4~~3. The method of any one of the preceding claims ~~further comprising prior to or after the contacting step, the step of: attaching said one or more dies to said leadframe, said leadframe comprising said contact leads having exposed metal surfaces and further~~ wherein said composition used in said contacting step has a pH from about 1 to about 7.

~~5~~4. The method of any one of the preceding claims, wherein said composition used in said contacting step comprises from 0.003 to about 25% by weight of one or more carboxylic acids.

~~65~~. The method of any one of the preceding claims wherein said composition used in said contacting step comprises an acid buffer solution, said acid of said acid buffer solution selected from a carboxylic acid or a polybasic acid and said acid buffer solution further comprising a salt of the acid in a molar ratio of acid to salt ranging from 10:1 to 1:10.

~~76~~. The method of claim ~~65~~ further wherein said acid buffer solution in said composition used in said contacting step comprises at least one of: acetic acid/acetate salts, benzoic acid/benzoate salts, and phenolic acid/phenolate salts.

~~87~~. The method of any one of the preceding claims wherein said composition used in said contacting step comprises about 0.003 to about 4% by weight of at least one hydroxyl carboxylic acid, salt thereof or mixture thereof or an amine group-containing carboxylic acid, salt thereof or mixture thereof.

~~98~~. The method of any one of the preceding claims wherein said composition used in the contacting step comprises one or more carboxylic acids, salts or mixtures thereof selected from the group consisting of citric acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid and fumaric acid, and salts thereof or mixtures thereof.

~~109~~. The method of any one of the preceding claims wherein said composition used in the contacting step comprises citric acid.

~~1110~~. The method of any one of the preceding claims wherein the composition used in said contacting step comprises:

about 0.005 to about 16% by weight of at least one carboxylic acid, salt thereof or mixture thereof;

about 0.003 to about 4% by weight of at least one hydroxyl carboxylic acid, salt thereof or mixture thereof or an amine group-containing acid, salt thereof or mixture thereof; and the remainder being substantially water.

~~1211~~. The method of any one of the preceding claims wherein said composition used in the contacting step comprises two or more carboxylic acids, salts or mixtures thereof selected from the group consisting of citric acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid and fumaric acid, and salts thereof or mixtures thereof and further comprises one or more solvents, one or more fluorides, and optionally one or more surfactants.

~~13~~12. The method of any one of the preceding claims wherein said composition used in said contacting step comprises fluoride selected from the group consisting of compounds of the general formula $R_1R_2R_3R_4NF$ where R_1, R_2, R_3, and R_4 are independently hydrogen, an alcohol group, an alkoxy group, an alkyl group or mixtures thereof.

~~14~~13. The method of any one of the preceding claims wherein said composition used in said contacting step further comprises one or more components selected from the group consisting of organic polar solvent, fluoride, surfactant and corrosion inhibitor.

~~15~~14. The method of any one of the preceding claims wherein said composition used in said contacting step further comprises organic polar solvent and fluoride.

~~16~~15. The method of any one of the preceding claims wherein said composition used in said contacting step further comprises a solvent selected from the group consisting of dimethylacetamide (DMAC), monoethanolamine, n-methylethanolamine, formamide, n-methyl formamide, gamma-butyrolactone, N-methylpyrrolidone, dihydric alcohols, polyhydric alcohols, diols and polyols such as (C_2– C_{20}) alkane diols and (C_3– C_{20}) alkane triols, cyclic alcohols and substituted alcohols and glycols, a glycol ether, tetrahydrofurfuryl alcohol (THFA), diacetone alcohol, 1, 4-cyclohexanedimethanol, and ureas and mixtures thereof.

~~18~~16. The method of any one of the preceding claims wherein said composition used in said contacting step further comprises 30% by weight to 90% by weight of an organic polar solvent; 0.0005% by weight to 20% by weight of a fluoride; 0.5% by weight to 40% by weight water; up to 15% by weight of an optional corrosion inhibitor.

~~18~~17. The method of any one of the preceding claims wherein said composition used in said contacting step has a pH ranging from 3 to 7; and said composition comprises 30% by weight to 90% by weight of said organic polar solvent; 0.001% by weight to 20% by weight of said fluoride; up to 15% by weight of an optional surfactant, and further wherein said water is present from 0.5% by weight to 40% by weight.

~~19~~18. The method of any one of the preceding claims wherein said composition used in the contacting step comprises an ammonium salt.

~~20~~19. The method of any one of the preceding claims wherein said composition used in the contacting step comprises propylene glycol or dimethylacetamide or mixtures thereof.

~~21~~20. The method of any one of the preceding claims wherein said composition used in the contacting step further comprises one or more surfactants.

~~22~~21. The method of any one of the preceding claims wherein said composition used in said contacting step comprises:

about 0.1 to about 3% by weight of at least one dicarboxylic acid, salt thereof or mixture thereof;

about 0.05 to about 1.5% by weight of at least one hydroxyl carboxylic acid, salt thereof or mixture thereof;

and the remainder being substantially water, and said composition having a pH of about 1 to about 4.

~~23~~22. A composition used for cleaning a leadframe assembly or parts of a leadframe assembly used in the contacting step in any one of the preceding method claims.